

ROADS and STREETS

HIGHWAYS • BRIDGES • AIR FIELDS • HEAVY CONSTRUCTION

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UNIVERSITY MICROFILMS
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ANN ARBOR, MICH.
COMP-LTRV-11-50

JULY 1955

PUSH BUTTON BATCHING

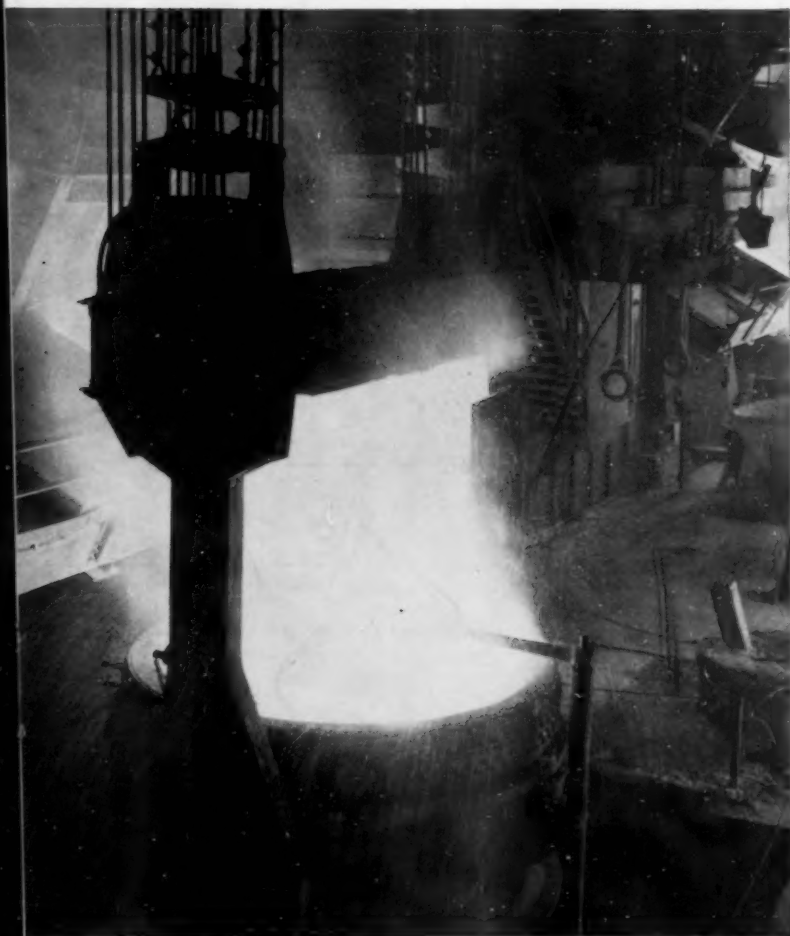
Today's Bigger Equipment
— Will It Pay Off?

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Accepted as Controlled Circulation
Publication at Cedar Rapids, Iowa

We make our own fine alloy steel—and make it nickel-rich
to make **TIMKEN®** bearings tougher



NICKEL makes steel tougher. So, our steel-making specialists don't skimp on nickel in the fine alloy steel we make for Timken® tapered roller bearings. They use exactly the right amount of nickel to give these bearings the toughness they need to withstand shock and last longer. Exact quantities of chromium or molybdenum or both guarantee uniform hardness. By using the steel industry's first direct-reading spectrometer, we exercise hairline control of each element at the precise instant of tapping the furnace.

Rolling, annealing, and cooling are done with the same meticulous care. And every race and roller that goes into a Timken bearing is precision case-carburized to give it a hard, wear-resistant surface over a tough, shock-resistant core.

We've been specializing in the production of fine alloy steel for almost forty years. We're the only bearing manufacturer in the country that makes its own steel, because it's the only way we can make sure the quality of our bearing steel is just the way we want it. Steel is the heart of the bearing. That's why we insist on controlling bearing quality every step of the way—from melt shop to final bearing inspection. And that's why we don't skimp on the use of nickel.

To be absolutely sure of the highest performance standards in the equipment you build or buy, always specify Timken tapered roller bearings. They are made from seamless tubing or forgings by the most modern processes, under strict control. Only Timken bearings roll so true, have such quality thru-and-thru. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".



This symbol on a product means
its bearings are the best.

Only **TIMKEN®** bearings roll so true,
have such quality thru-and-thru





P&H MITI-MITE® (Model 55TC) on road work in Colorado



P&H Model 155, 1/2-yd. dragline working near Tulsa, Okla.

P&H ...20 YEARS OF ALL-WELDED CONSTRUCTION

Harnischfeger Corporation produced the *first* all-welded excavator early in 1935. Why? Because 20 years ago, Harnischfeger realized that all-welded construction on excavators gave features such as these to P&H users:

1. The strongest construction known . . . stronger per pound of weight than comparable cast construction.
2. The best suited material for each component part of the excavator! The manufacturer is able to select the right combination of alloy steels for a particular function.
3. The elimination of dead weight! Thru a liberal use of alloy steels, it's possible to build up strength ex-

actly where it's needed most. Gone are beefed-up, power consuming castings.

4. Revolving frame, including side stands, is built entirely of rolled steels and welded as a rigid unit, permitting machining as a single unit to insure perfect alignment.

Thru the years, thousands of P&H owners have enjoyed these cost-cutting advantages on their jobs. And, today, P&H buyers have the added benefits gained in two decades of experience and know-how in all-welded construction. See your P&H dealer or write P&H Power Crane and Shovel Division, Harnischfeger Corporation, Milwaukee 46, Wisconsin.

HARNISCHFEGER

the **P&H** *Line*



TRUCK CRANES



DIESEL ENGINES



POWER SHOVELS



PREFABRICATED HOMES



HOISTS



SOIL STABILIZERS

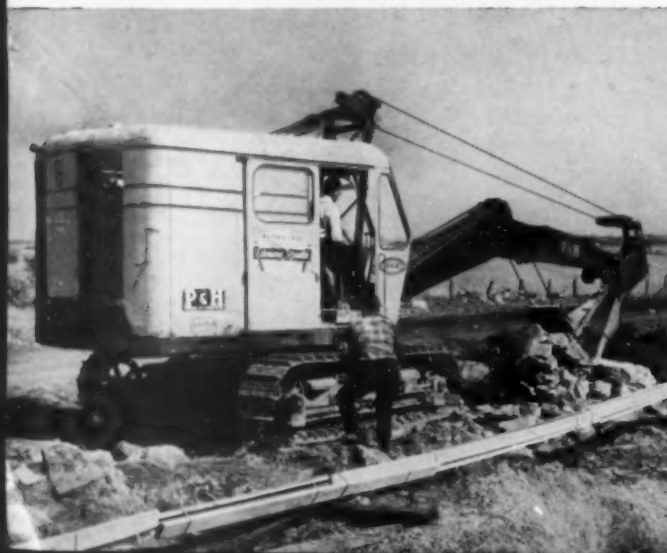


WELDING EQUIPMENT



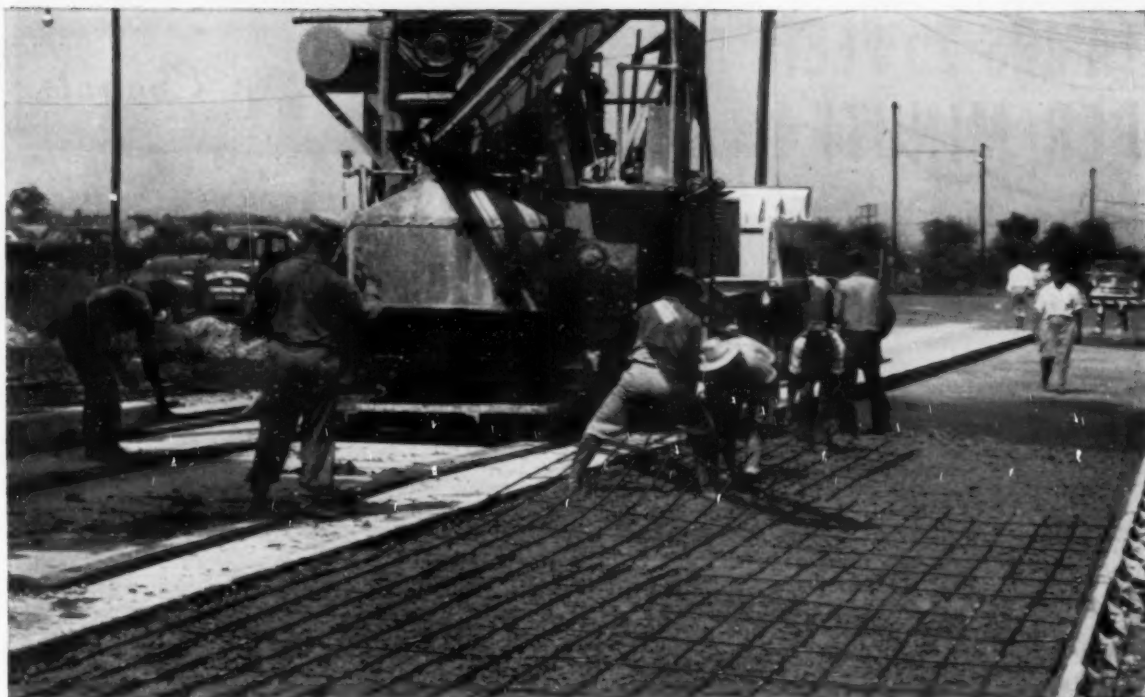
OVERHEAD CRANES

P&H 255-A trench hoe (3/4-yd.) on ditching job in Quebec



255-A truck crane clears land for new road. Long Island, N. Y.





Collins and Maxwell, Easton, Pa., lay Bethlehem fabricated bar mats on first continuously-reinforced road to be built in the East.

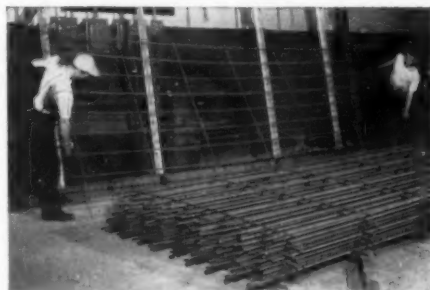
First Concrete Road in East with Continuous Reinforcement

The first concrete road in the East continuously reinforced with deformed bars was completed last fall at Bethlehem, Pa. Shop-fabricated bar mats, designed especially for this type of paving, were used in building the road.

The western portion of Eaton Avenue, in Bethlehem, is a heavily-traveled stretch of road which connects the main traffic artery between Bethlehem and Allentown with U. S. Route 22, an east-west through route. Two motor cargo carriers have terminals located near Eaton Avenue, contributing largely to the heavy traffic load.

When resurfacing was necessary last year, it was decided to pave 1020 ft with an 8-in. pavement continuously reinforced with deformed bars.

No transverse contraction or expansion joints were used. Instead, specially-made mats of deformed bars were laid to form the continuous steel reinforcement. The mats, furnished by Bethlehem, weighed 180.9 lbs per 100 sq ft, and were placed after the first course of concrete was struck off just as ordinary mats are placed in reinforced concrete paving, without any necessity for accessories.

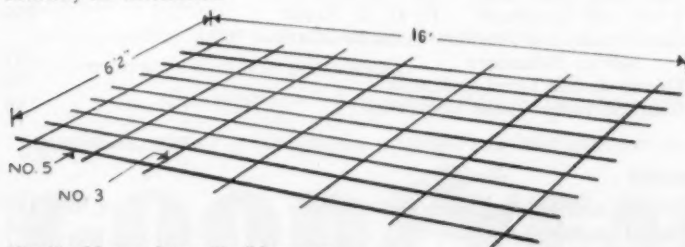


BAR FABRICATING SERVICE

Bethlehem can supply reinforcing bars for any type of construction project, including bar mats of any design and in any quantity. There are ten conveniently-located bar fabricating shops at your service: Boston, New York, Philadelphia, Johnstown, Pa., Baltimore, Buffalo, Detroit, Chicago, St. Paul and Seattle.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation, Export Distributor; Bethlehem Steel Export Corporation

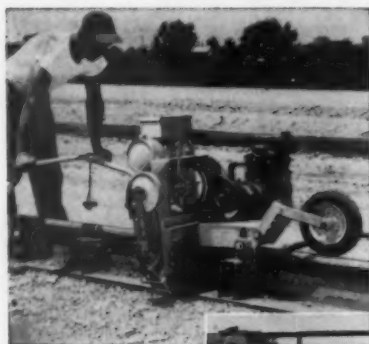


Nine No. 5 bars and seven No. 3 bars were used to fabricate bar mats for Eaton Avenue.

... for more details circle 172, page 16

BETHLEHEM STEEL

TAMPS 25 FEET PER MINUTE!



**Contractors
Save Time
And Money On
Ohio Turnpike
with "Form
Tampers"**



In just a few hours one man with a FORM TAMPER can tamp and oil the forms for the full day's run! And the FORM TAMPER does a better, more uniform job of tamping than can be done by hand. Result: a smoother concrete surface at lower cost—in less time.

**SEND COUPON NOW FOR
INFORMATION ON . . .**

- FORM TAMPERS
- FORMGRADERS
- TRAIL GRADERS
- STRAIGHT EDGES
- SUBGRADE SCRATCH
TEMPLATES

**THE CLEVELAND
FORMGRADER COMPANY**

Mills Road, Avon, Ohio

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Firm _____

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ROADS AND STREETS

Sixty-Three Years of Editorial Leadership

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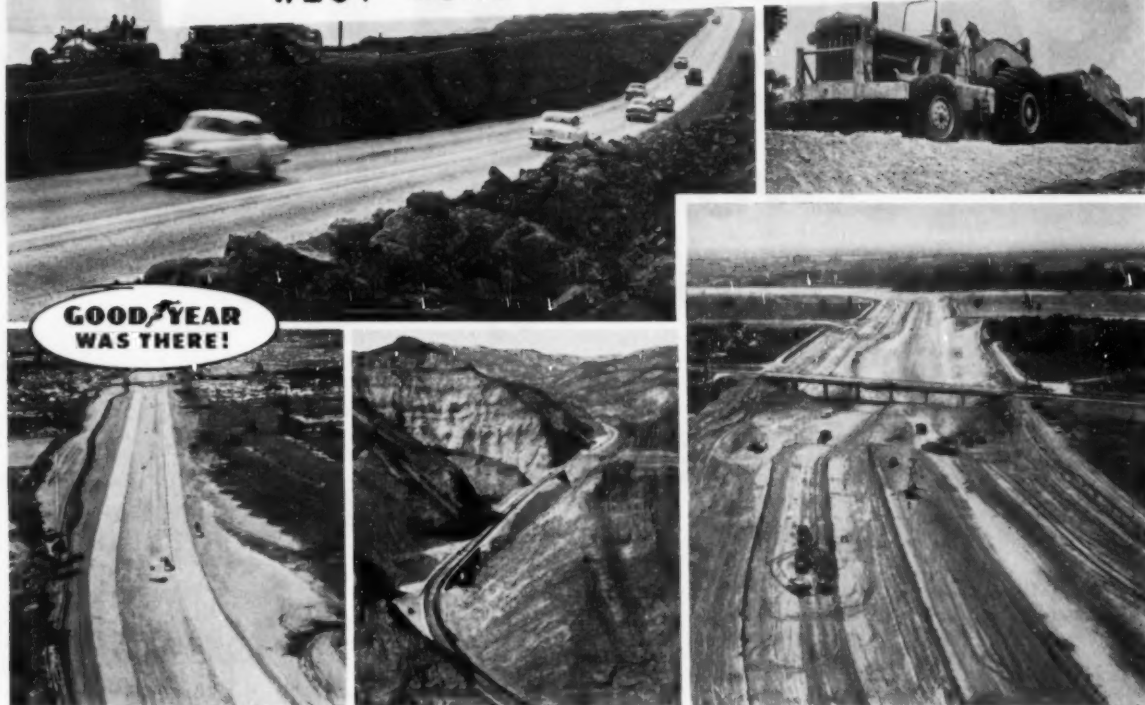
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Accepted as Controlled Circulation Publication at Cedar Rapids, Iowa

ROADS AND STREETS, July, 1955

3 GENERATIONS BUILD

WEST COAST CONSTRUCTION EMPIRE



**GOODYEAR
WAS THERE!**

Starting 76 years ago, as a small contractor, Adolph Teichert built the versatile organization that has what it takes to lick the big ones pictured above. Today, when you see a giant West Coast job—quarrying, earth-moving, road, rail bed, military base or dam building—it's a fair bet that A. Teichert & Son, Inc., have a hand in it! Earthmover shown above has Goodyear Hard Rock Rib tires on front wheels, Hard Rock Lug on rear.

Longest-lived tires in any generation are built with 3-T NYLON CORD!

A GOODYEAR EXCLUSIVE, 3-T NYLON CORD can *obsolete* your present tire-cost calculations. It makes Goodyear tires so durable that bruise-breaks and heat-blowouts are close to the vanishing point. Ply separation and flex failure have also been virtually eliminated—keeping bodies in shape for many more re-lugs and recaps. In fact, 3-T NYLON CORD has **ADDED** so much to Goodyear tire life—and **SUBTRACTED** so much from operating costs—that it's simply good business to try Goodyear 3-T Nylons on your toughest operations!

Goodyear Truck Tire Dept., Akron 16, Ohio

FOR EACH JOB, THERE'S A COST-CUTTING GOODYEAR TIRE BUILT WITH 3-T NYLON CORD

GOODYEAR

MORE TONS ARE HAULED ON GOODYEAR TRUCK TIRES THAN ON ANY OTHER KIND

Road Lug, Sure-Grip, All-Weather—T. M.'s The Goodyear Tire & Rubber Company, Akron, Ohio
... for more details circle 200, page 16

ROADS AND STREETS, July, 1955



Look for this sign;
there's a Goodyear Dealer near you.

NEW FROM CATERPILLAR!

**TWO MODERN,
COMPACT,
HEAVY-DUTY
DIESEL ENGINES**



**THE NEW
D342**

190 HP

171 HP

152 HP

This is the same trouble-free engine which powers Caterpillar's mighty D8 Tractor and No. 583 Pipelayer. Coming soon: the new D342 Electric Set!



**THE NEW
D339**

126 HP

112 HP

100 HP

INTERMITTENT OUTPUT

Maximum recommended for loads of short duration (1 hour or less) with equal periods at idle or low load.

RATED OUTPUT

Maximum recommended for loads of moderate duration (12 hours or less) with equal periods at idle or low load.

CONTINUOUS OUTPUT

Maximum recommended for loads of unlimited duration.

All at 1200 r.p.m. with full equipment

Balancers—standard equipment on the new D339—give this powerful 4-cylinder engine all the smoothness of 6-cylinder performance!

Here are the latest advances in diesel engine design. Compared to other engines in their class, these two new CAT* Engines offer you better operation, less maintenance, higher horsepower and more compact design. Take a quick look!

CHOICE OF STARTING SYSTEMS!

AIR

For fast starts where a supply of compressed air is readily available, a sturdy vane-type air motor is offered. Also available: air compressors and storage equipment.

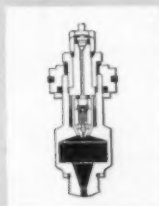
ELECTRIC

Where speed of starting is especially important. Also available: automatic start-stop controls which require no operating personnel.

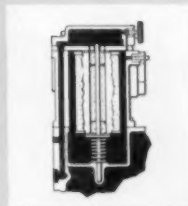
GASOLINE

For all-weather starting. This system preconditions the diesel, and supplies full lubrication before diesel is started. Also available: electric starters for the gasoline starting engine.

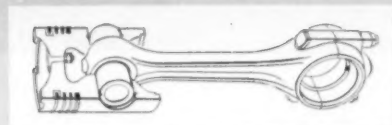
ECONOMICAL FUEL SYSTEM!



Same famous tinker-free fuel system so successful on other Caterpillar Engines. Capsule-type injection valves with single, large, fail-proof orifices, plus special precombustion chambers, permit these engines to operate—even idle—on low-cost non-premium fuels. And full-flow filtering is assured with new paper-type element that is not affected by water.



FIELD-TESTED PISTON ASSEMBLIES!



Pistons, rings and rods in these two new engines are like those used in Caterpillar's famous V-type Engines. Heat plugs, chrome-faced rings, cast-iron top ring bands give thousands of hours of operation before inspection is necessary.

MANY OTHER IMPORTANT FEATURES!

BRIEF SPECIFICATIONS

D342	Four-cycle, valve-in-head	D339
6	Number of cylinders	4
5 3/4 in. x 8 in.	Bore and stroke	5 3/4 in. x 8 in.
1246 cu. in.	Piston displacement	831 cu. in.
1200	Rated speed, r.p.m.	1200
425	Low idle speed, standard, r.p.m.	425

Your Caterpillar Dealer has full details on both of these compact, new engines. Call him today for modern heavy-duty diesels. And remember him, too, for prompt, complete installation and service.

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

We'd be glad to send you more information on the new D342 and D339. Just mail the coupon below.

CATERPILLAR TRACTOR CO., Dept. 8594,
Peoria, Illinois, U. S. A.

Send me complete details on the new D342 and D339.

Name _____

Address _____

City _____ State _____

... for more details circle 176, page 16

CATERPILLAR*

*Both Cat and Caterpillar are registered trademarks—(C)

THE D342 AND D339—LATEST
EXAMPLES OF CATERPILLAR
LEADERSHIP IN ACTION



Bank on a *Task-Force* Truck

With pickup or heavy-duty Chevrolet model, you'll save money on the job —and be way ahead at trade-in time!



You save with modern high-compression power—In the $\frac{1}{2}$ -ton model, a new Thriftmaster engine is supplying the power punch. It's a new Loadmaster in the heavy-duty model (or a big 140-h.p. Jobmaster, an extra-cost option). With all of these great Chevrolet engines you get the most out of a gallon of gas. You accelerate fast, level the hills that could cut valuable time from your schedules. And even in cold weather you start more quickly with Chevrolet's hefty 12-volt electrical system. That's a big advantage in itself—a husky reserve of electrical power when you need it!

NEW CHEVROLET



to Cut Your Operating Costs!

You save with the most modern truck features your industry has ever seen—New standard-width frames—more rigid with completely parallel side members. Panoramic windshield, High-Level ventilation, softer seats and new concealed Safety Steps—they're features that make Task-Force trucks extra easy to live with. Driving's less of a chore. And with driver efficiency up, you'll stay even with your tightest schedules, save money in the long run!

And you save with these extra-cost power helpers—You're bound to save money when you can maintain peak efficiency! You can't beat Hydra-

Matic for easing the strain of stop-and-go hauling (available in $\frac{1}{2}$ -, $\frac{3}{4}$ - and 1-ton models). Power Steering takes away as much as 80% of turning effort. And Power Brakes (standard on 2-ton models) add a lot of safety to everyday driving. You'll be glad to know that tubeless tires come at no extra cost on $\frac{1}{2}$ -ton models.

Why buy an old-fashioned truck and stand to take a licking at trade-in time? See your Chevrolet dealer for the most modern truck money can buy. . . . Chevrolet Division of General Motors, Detroit 2, Michigan.

Task-Force TRUCKS

. . . for more details circle 194, page 16

ROADS AND STREETS, July, 1955

SERVICISED PRODUCTS

for Concrete Paving



The average concrete paving job, whether it be an airport runway, a city street, or a state highway or turnpike, requires the use of four groups of Servisised Products. The first of these is **AIR ENTRAINING AGENT** added to the concrete at the mixer to produce a more durable concrete.

◀ Premolded Expansion Joint Fillers

KORK-PAK — an exclusive Servisised development — is the all-purpose concrete paving joint filler. Composed of cork granules bonded together with asphalt between two sheets of heavy asphalt saturated paper. **KORK-PAK** is the lowest cost non-extruding joint filler on the market. **KORK-PAK** recovers more than 80% of original thickness after compression, and has a very low rate of moisture absorption. Available in $\frac{1}{4}$ ", $\frac{3}{8}$ ", $\frac{1}{2}$ ", $\frac{3}{4}$ ", and 1" thicknesses and standard lengths of 5 or 10 ft. Longer lengths available on special order. The Servisised premolded joint filler line also includes Asphalt, Cork, Self-Expanding Cork, and Sponge Rubber types, as well as Longitudinal Tongue and Groove Joint and premolded Dummy Contraction Joint.

Joint Sealers ▶

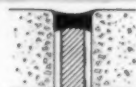
Para-Plastic Hot-Poured Joint Sealer is an extremely stable rubberized asphalt compound that forms a resilient, adhesive and effective seal — keeping the joint completely protected under any and all conditions of temperature, moisture and traffic. **Para-Plastic** is pumped directly into the joint from the melting kettle.

Para-Plastic JF for airport paving has the sealing characteristics of the standard compound, but in addition is impervious to solvents and jet fuel spillage.

SERVITE Cold-Applied Joint Sealer is a bituminous rubber sealer so compounded that it can be pumped cold from the drum in which it is shipped directly into the joint to be sealed.



Joints compressed in warm weather temperatures



Joints opened in sub-zero temperatures



◀ Membrane Curing Compounds

Available in two types—White Pigmented and Clear. Sprayed or painted on concrete, they form a uniform, moisture-retaining membrane to insure proper curing. Pigmented type reflects heat, reducing temperatures as much as 15°; Clear type, available with fugitive dye to assist in getting uniform coverage, is used indoors or where natural color of the concrete must be retained.

Write for the Servisised Catalog today



SERVICISED PRODUCTS CORPORATION

6051 WEST 65th STREET • CHICAGO 38, ILLINOIS

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ROADS AND STREETS

Devoted to the design, construction, maintenance and operation of highways, streets, bridges, bridge foundations and grade separations; the construction and maintenance of airports. Represents 63 years of continuous publishing in the highway field; combined with Engineering & Contracting and Good Roads Magazines, established in 1892.

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A New PM TOOL for Diesels



SAVE Time, Money, Oil and
Engines with the Shell
ADC* Oilprint Analysis

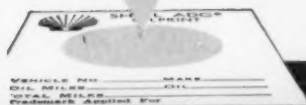
Now—operators can test crankcase oil in the short time allotted for re-fueling and oil level checks. The Shell ADC Oilprint Analysis gives a practical and accurate oil evaluation in minutes.

ADC Oilprint Analysis means big savings when used in your preventive maintenance program . . . gives valuable information on engine and oil conditions. It answers the question "When do I change my oil?" thus eliminating the draining of usable oil and the risk of using oils loaded with contaminants.

See for yourself how the new Shell ADC Oilprint Analysis can save you real money in preventive maintenance.

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*Let us demonstrate how you
can use this Service for Your Diesels*



SHELL OIL COMPANY

50 WEST 50TH STREET, NEW YORK 20, NEW YORK
100 BUSH STREET, SAN FRANCISCO 6, CALIFORNIA



. . . for more details circle 239, page 16

ROADS AND STREETS, July, 1955

New Increased Power International

- NEW** Power... New gearing... New ruggedness—for greater production
- NEW** Track Frames... 300 per cent stronger
- NEW** Finger-Tip Power Steering... advanced hydraulic design
- NEW** Operator Compartment... comfortable driver's seat—easy-to-reach controls
- NEW** Track Roller Oil Seals... 500-hour period between lubrications
- NEW** Positive Self-Energizing Brakes, 13% more effective brake area
- NEW** Appearance... sleek grille, heavy fenders, 75-gallon fuel tank. Better visibility... control-tower view front and rear

LOOK AT THAT LOAD as operator applies 103-drawbar hp of new TD-18A. Steering is effortless with new hydraulic finger-tip controls and positive, self-energizing brakes.



TD-18A Now with 103 Drawbar H.P.

Here's the crawler tractor with everything contractors need to meet increased competition—increased workpower, increased ease of operation, increased durability:

The improved INTERNATIONAL TD-18A, now with 103-drawbar horsepower at 24,300 lbs. maximum drawbar pull in first gear at rated rpm.

Double check all these great new TD-18A features—right here on these pages—on your job where you can take over the controls and appraise their value in extra work done for lower cost. Your INTERNATIONAL Industrial Power Distributor will arrange your own personal shake-down test of the TD-18A any time you say.

INTERNATIONAL HARVESTER COMPANY, CHICAGO 1, ILLINOIS



INTERNATIONAL
INDUSTRIAL POWER

MAKES EVERY LOAD A PAYLOAD

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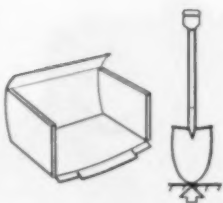


**Outstanding,
New Allis-Chalmers
Earth-Moving Team:**

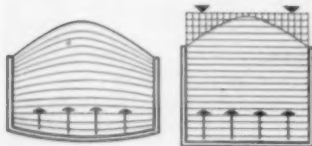
Model 315 scraper, with 20-yd heaped capacity, pulled by an HD-16 Tractor (150 net engine hp with torque converter drive, 131 belt hp with standard transmission drive).

Look At The Dirt-Moving Advantages of Allis-Chalmers Scrapers

Digs in Fast. Curved and offset cutting edge on Allis-Chalmers scrapers concentrates initial digging effort at center for faster penetration — as with a round-end, curved-bottom spade.



Loads with Less Resistance. Low, wide bowl reduces loading time, requires less power.

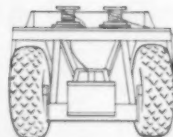


Heaps Loads with a Minimum of Spillage.

Combination of deep center cut and correct angling of cutting edge loads the scraper with minimum spillage. "Boiling" action fills voids, produces automatically well-heaped loads.

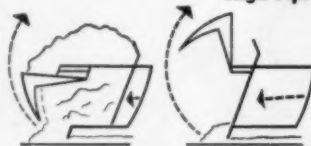
Hugs the Ground for Stability. The wide, low bowl keeps scraper center of gravity low . . . wide wheel tread adds stability for working on slopes, grades, or rough terrain.

Hauls, Maneuvers Easily. Big, low-pressure tires provide maximum flotation. A short wheel base permits scraper to turn within its own length.



High Apron Lift Prevents Jamming.

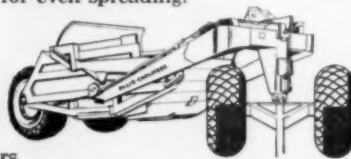
Apron lift is high — as much as 102 in. in the Model 315. Prevents any possibility of material jamming.



Dumps with Positive Ejection, Spreads Evenly. Ejector forces load forward, wipes bowl clean. Operator can control rate of discharge for even spreading.

Ground Clearance.

Front-running gear has ample clearance. High carrying position of bowl enables Allis-Chalmers scrapers



to clear ruts, windrows and other obstructions.

Model 315

15 yd struck
20 yd heaped

Model 108

8.4 yd struck
11 yd heaped

Model 106

6.1 yd struck
7.5 yd heaped

Model 44*

4 yd struck
4.7 yd heaped

Model 24*

2 yd struck
2 yd heaped

*Hydraulically controlled

COMPARE Allis-Chalmers scrapers with others, feature by feature, dollar for dollar, and you'll see why they are your best buy in every way.

ALLIS-CHALMERS

TRACTOR DIVISION — MILWAUKEE 1, U. S. A.



paved by Schultz & Lindsay with this BLAW-KNOX "Complete Package"

The Blaw-Knox "Complete Paving Package" used by Schultz & Lindsay

• Cement Batching Plant • Aggregate Batching Plant • Precision Subgrader • Self-Aligning Steel Paving Forms for Roads and Airports • Steel Forms for Curb, Curb and Gutter, Integral Curb, and Median Dividers • Concrete Spreader with Vibrating Attachment (also available with screed attachment) • Concrete Finishing Machine

For your job, you can add

• Clamshell Buckets • Concrete Buckets • Base Course Pavers • Road Wideners and Trench Rollers • A "Complete Package" of ready-mix equipment, including Hi-Boy Truckmixers and one-step Truck Mixer Loading Plants

See your BLAW-KNOX distributor about "Complete Package" advantages

North Dakota started the ball rolling toward faster travel between Grand Forks and Winnipeg by awarding Schultz & Lindsay Construction Company the contract to pave 11.4 miles of State Highway 44. And the Fargo contractor kept the job rolling by using a Blaw-Knox "Complete Package" of paving equipment to step up the paving operation to a profitable, schedule trimming pace.

Wherever there's a big paving project . . . super-highway, toll road, expressway . . . or airport runway . . . you'll probably find a balanced team of Blaw-Knox units speeding the job. More and more contractors all over the country are taking advantage of the one-source, one-responsibility economies of Blaw-Knox "Complete Package" paving methods.



BLAW-KNOX COMPANY
CONSTRUCTION EQUIPMENT DIVISION, Pittsburgh 38, Pa.
Offices in Principal Cities



Blaw-Knox Aggregate Batching Plant



MultiFoot 34E DuoMix Concrete Paver



Blaw-Knox Finishing Machine and Concrete Spreader



Blaw-Knox Bulk Cement Batching Plant

... for more details circle 173, page 16

WHAT'S NEW in Equipment and Materials

Air Entraining Agent

A new air entraining agent, "Entrex," a product of years of field experience and laboratory research, has been introduced by Preco Chemical Corp., Garden City Park, N.Y. It is stated that "Entrex" added to concrete in properly controlled amounts will yield the following money-saving properties for its users: Improved durability; superior resistance to the disintegrating effect of freezing, thawing and de-icing salts; increased workability; elimination of bleeding, segregation and honey-combing; finer surface texture; greater placeability (plasticity); and concrete products with less breakage, higher compressive strength and lower water absorption. "Entrex" meets all Government and ASTM specifications.

For more information circle 101 on Service Coupon this page and mail now.

Portable Electric Plants

Two models of Gen-A-Matic electric plants have been announced by Multi-Matic Corporation, 14471 Bessemer St., Van Nuys, Calif.

The 17A is an AC model with a rugged, four-cycle engine. It weighs only 95 lb. It puts out 1.7 kilowatts offering assured, steady power for standby use and mobile applications. A 12-volt crank winding that provides for easy installation of push-button or automatic control is standard equipment.

The new 17D Gen-A-Matic is the DC model of this new design. It also has been lightened for extreme portability.

Fuel capacity of both models has been increased to 5 qt. from the former 1 gal. capacity. Increased fuel economy has also been made possible through the design revisions of these Gen-A-Matics.

For more information circle 102 on Service Coupon this page and mail now.

Automatic Transmission Gasket Sets

A complete line of Velvetouch automatic transmission gasket sets, for all passenger cars and light trucks, has been announced by The S. K. Wellman Co., Bedford, O.

Available in single sets and combinations, the single Velvetouch sets contain all the replacement gaskets needed to complete a transmission rebuilding job on a specific make and model of car or truck, while the combination Velvetouch sets will accommodate any one of several jobs having the same type of transmission.

For more information circle 103 on Service Coupon this page and mail now.

Pipeline and Utility Ditcher

A new pipeline and utility ditcher, the Buckeye Model 308 introduced by Gar Wood Industries, Inc., Wayne, Mich., is a heavy-duty, wheel-type ditcher especially designed for digging cross-country ditch and for city gas, water, oil, sewer, conduit and cable lines. It digs to a maximum depth of 5 ft. 6 in. with optional width of cut varying from 16 in. to 32 in. increments.

A live hydraulic wheel hoist provides

fast and accurate positioning of the digging wheel. The hoist is operated by simple one-hand controls from the operator's seat and the lowering and raising of the digging wheel is completely independent of digging, wheel or crawler speeds. Soil discharge conveyor shock damage is eliminated by an hydraulic drive — as opposed to a mechanical drive from the digging wheel.

Variation in tread width and bearing area for the tractor-type crawlers with smooth cast treads, is obtained through a selection of tread pads to suit all digging requirements. The crawler idler rollers have face-type seals for long life,

More equipment news on pages 124-133

Bolt-on grousers are optional. Ground bearing pressure with standard 16 in. tread shoes is a maximum of 5.6 lb. per square inch.

The Buckeye 308 has 16 digging speeds forward, ranging from .80 to 19.10 feet per minute. Excavator wheel speeds and traction speeds are entirely independent of each other, making the machine extremely versatile in all digging operations.

For more information circle 104 on Service Coupon this page and mail now.

Improvements in Earthmoving Equipment

Recent improvements in its line of earthmoving equipment have been announced by Caterpillar Tractor Co., Peoria 8, Ill. Large idler groups, which are now offered as attachments for the D4 tractor, will be changed to the fabricated disc-type. The groups will continue to be offered as attachments. The fabricated idlers are wider than the cast idlers and have hardened rims to give longer service life. Tangling of branches, mud packing, etc. is avoided with the elimination of spokes. This improvement has been added at no increase in price of the attachment. The standard D4 tractor will include the smaller idler groups of the spoke-type. Special D4 arrangements which include the large idler groups will be changed to include the large idler groups of the disc type. There will be no increase in price.

Larger, rigid-type push blocks are now included in the company's No. 70 scraper and No. 15 scraper at no increase in price. The larger pushing surface will provide a greater contact area for the pusher bulldozer blade — adding further protection to the scraper tires and ejector system.

For more information circle 105 on Service Coupon this page and mail now.

For more items . . . see page 124

MAIL THIS COUPON TODAY!

ROADS & STREETS
22 West Maple Street
Chicago 10, Illinois

**CIRCLE THE
NUMBERS
AND MAIL NOW!**

Please send me further information on products and materials mentioned in the July Roads & Streets as circled below

About New Equipment and Literature:

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NOT GOOD AFTER AUGUST 15, 1955

A READER SERVICE FOR YOUR NEEDS

MEETING THE ROCK JOBS

THE EASIEST WAY...



WITH A
NORTHWEST

● Look at that Rock Pile! Ability to handle stuff like this is what backs up our statement, "that when you have a Northwest you have a *real* Rock Shovel." Performance in digging like this makes repeat orders, and repeat orders mean satisfaction.

Northwest design begins from the bottom up for rock work—cast steel machinery bases and machinery side frames, crawlers that give self-cleaning action and more easily negotiate tough going, the Cushion Clutch that eliminates shock overloads to parts under power,

the "Feather-Touch" Clutch Control for easier handling, Uniform Pressure Swing Clutches that take the jerks and grabs out of swinging, the Northwest Dual Independent Crowd that utilizes force most other independent crowd shovels waste—these are but a few of the advantages that Northwest Rock Shovels bring you. And remember, if you have a *real* Rock Shovel you never have to worry about output in *any* digging. With the advantages and proved performance of a Northwest it's no wonder Northwest owners come back!

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NORTHWEST

SHOVELS • CRANES • DRAGLINES • PULLSHOVELS





One Man Drives 1600 Form Pins a Day!


Again Le Roi Tractair's portable air-power
helps get more done—at less cost

When you're driving form pins at the rate of 200 an hour, you're saving money. And that's exactly what the Tractair unit is designed to do. Here's how:

Tractair is a combination 42-hp wheel tractor and 125 cfm compressor. This means it is extremely mobile—takes air-power almost anywhere you need it. It can do a lot of things for you — drill rock, tamp fill, break concrete, vi-

brate concrete. It can be fitted with attachments, too, so that you can load, backfill, sweep, and plow.

Yes, the Tractair unit can do 101 odd jobs for you, save you money on all of them, and you don't have to tie up trucks or men to use it. So write for our latest literature and find out how the versatility of Le Roi Tractair can help you cut costs on a wide variety of jobs.

LE ROI  Division of Westinghouse Air Brake Co.
Milwaukee 14, Wisconsin



PORTABLE AIR COMPRESSORS



TRACTAIR



STATIONARY AIR COMPRESSORS



AIR TOOLS



ENGINES

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Great Falls — NEBRASKA: Lexington, Lincoln, Omaha — NEVADA: Reno — NEW HAMPSHIRE: Manchester — NEW JERSEY: Cranford, Kingston — NEW MEXICO: Albuquerque — NEW YORK: Albany, Binghamton, Buffalo, Massena, Rochester, Saugerties, Syracuse, Whitesboro, Woodside (L. I.) — NORTH CAROLINA: Charlotte — NORTH DAKOTA: Grand Forks — OHIO: Cincinnati, Cleveland, Columbus, Dayton, Toledo — OKLAHOMA: Oklahoma City, Tulsa — OREGON: Portland — PENNSYLVANIA: Harrisburg, Philadelphia, Pittsburgh, Wilkes Barre — RHODE ISLAND: E. Providence — SOUTH CAROLINA: Columbia — SOUTH DAKOTA: Sioux Falls — TENNESSEE: Chattanooga, Knoxville, Memphis, Nashville — TEXAS: Beaumont, Dallas, El Paso, Houston, Lubbock, Midland, San Antonio — UTAH: Salt Lake City — VIRGINIA: Richmond, Roanoke — WASHINGTON: Seattle, Spokane — WEST VIRGINIA: Clarksburg, South Charleston — WISCONSIN: Green Bay, Milwaukee — WYOMING: Casper.

... for more details circle 217, page 16

ROADS AND STREETS

Sixty-Three Years of Editorial Leadership

Washington News Letter



By Duane L. Cronk

July 8, 1955

Organized labor, ogling the big money apparently on the way for an accelerated roadbuilding program, is making its bid to get into highway construction as never before. Although generally overlooked, therein lie the seeds of strife for years to come. A.F. of L. representatives, testifying on federal-aid highway legislation for the first time, last month, before both the House and Senate committees, served notice that the unions want "in the act." Specifically, just now, they want extension of the Davis-Bacon rules on wages and the federal laws on hours applying to construction of the National Interstate System.

"We will count it a major political victory to get the Davis-Bacon provision this trip, but we'll be back to pick up the 8-hour law, too, later, if not now," George Riley, A.F. of L. spokesman, has said. The union argument is that if Uncle Sam should pay 90% or more of the cost of the Interstate System, it should enforce its own labor regulations thereon.

Labor pressure forced inclusion of a Davis-Bacon clause in the Senate bill and it was only after fierce debate on the floor that the measure was dropped. A strong block of Southern senators is credited with killing the union-backed proposal. Effects of the wage rule would, by no means, be limited to Southern contractors and Southern highway departments, however.

That's why highway men are disturbed. Application of Davis-Bacon and the 8-hour laws to federal-aid work would provoke unprecedented labor problems for contractors, state highway officials, and the Bureau of Public Roads.

* * *

To contractors, it would mean terrific pressure for higher wages in many areas. Instead of paying the state minimum wage, they would have to pay the area prevailing wage. Instead of paying minimum wages on just three broad classifications (skilled, semi-skilled and unskilled), they would have to pay on a far more complex breakdown - perhaps 60 classifications - a routine that is unknown to many roadbuilders. They would run the constant risk of jurisdictional disputes. Instead of paying overtime on over-40 hours per week, they would have to pay on over-8 hours per day. That means that men who missed time during the week could still draw overtime for long days.

The prevailing wage would be determined by the Department of Labor, a decision that, in practice, is based on the highest union schedules. And, even though most road construction is through rural areas, the prevailing wage would probably be determined by the wage scale of the metropolitan area nearby - or not so nearby.

(continued on next page)

Contractors would be required to submit their weekly payrolls to the Department of Labor for checking, in case of complaint. They would be surveyed for compliance with prevailing wage schedules, proper classification of workers and 8-hour regulations.

Wages would be forced up at least 30% in some sections, it has been estimated. Union activity would be stimulated everywhere. It is little wonder that both the Associated General Contractors of America and the American Road Builders of America oppose the move.

* * *

State highway officials are worried, too. The American Association of State Highway Officials has asked Congress to leave the problem of wages and contractor-labor relations to the states. Alfred Johnson, AASHO's executive secretary, declared last month:

"It would raise the cost of every highway department operation, right across the board. A federal-aid highway act is no place for something like this."

Construction estimates would have to be revised as much as 15% upward, he predicted, if the provision were to become law. There would be a disruption of traditional federal-state relations in the highway field, excessive paper work and delays as a result of disputes.

* * *

The burden it would place on the Bureau of Public Roads can be imagined. Now, the BPR is staffed to handle only wage determination requests that come in for work on projects, such as park and forest roads, where the bill is paid entirely by Uncle Sam. Last year, there were 291 wage determinations requested. If the Davis-Bacon Act had applied last year to all federal-aid jobs, there would have been more than 8,000 wage determinations to handle - about 27 times as many as the bureau is now set up to process.

As many as 6,000 contractor payrolls a week would be subject to check for compliance with the law. And all these are 1954 figures. An accelerated road program could double this paper work almost overnight. The bureau would be put into the position of enforcing contractor-labor relations - to the point of withholding federal aid, for example, on a job where the contractor was not complying.

"It would put the bureau right in the middle," one Washington observer pointed out. "These federal-aid jobs have worked out fine under state contracts and state labor regulations. Davis-Bacon in the state highway field would be an unreasonable extension of federal controls. I'm sure the bureau wants no part of it."

* * *

In the meantime, the minimum wage boost from 75¢ to \$1.00 per hour appears certain of Congressional approval. The measure, at this writing, has passed the Senate and is pending in the House. It is hoped that there will be a six-months grace period, which would help contractors who have based bids on the lower wages.

GALION

14-20 TON



3-AXLE TANDEM ROLLER

The Galion 3-Axle Tandem Roller gives you a considerably smoother finish surface, and up to 60% greater tonnage of material compacted per day than with conventional tandems. You get faster and better compaction of joints and seams. Elimination of cross-rolling saves you time and money.

Other features include Galion ROLL-O-MATIC Torque Converter Drive . . . Synchronized hydraulic steering of twin guide rolls . . . Dual operating controls . . . Rugged straight-line spur gear final drive . . . Complete and easy accessibility of all operating parts. Write for literature.

*Utilizing a General Motors-Allison Torque Converter



**MAIL THIS
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TODAY**

THE GALION IRON WORKS & MFG. CO.
GALION, OHIO, U.S.A.

. . . for more details circle 193, page 16

ROADS AND STREETS, July, 1955

ROLL-O-MATIC^{*} TORQUE CONVERTER DRIVE IS STANDARD EQUIPMENT

GALION gives you the most effective and economical driving power obtainable. The ROLL-O-MATIC Torque Converter Drive differs from a fluid coupling drive. A fluid coupling transmission requires a manual gear shift mechanism, and the fluid coupling itself never multiplies engine power.

The Galion ROLL-O-MATIC Torque Converter Drive has no gear shift mechanism. Furthermore, it automatically MULTIPLIES the engine driving force by means of oil in motion instead of by transmission gears. It automatically APPLIES the driving force as the work demands, and automatically MAINTAINS desired roller speed regardless of grade or working conditions. Reversing action is velvet-smooth; shock loads are eliminated.



THE GALION IRON WORKS & MFG. COMPANY
Dept. R5-75 Galion, Ohio, U.S.A.

Please send me literature on the Galion Rollers checked.

- ☐ 3-Axle Tandem ☐ Three-Wheel ☐ Trench
☐ 2-Axle Tandem ☐ Portable

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CITY STATE



United States Rubber Company 4-year project pays off—
construction men report they're well ahead with U. S. Royal!



"On rock work, tire service increased 300%!"
says H. Earl Parker, Marysville, Calif.

"On tough jobs like Pine Flat Dam, we've had a tremendous increase in tire service since we switched to U. S. Royal Nylon Con-Trak-Tors. This has meant a substantial decrease in downtime on heavy equipment and a real economy for us in operating costs."

Tire Life Greatly Increased!

The U. S. Royal Con-Trak-Tor, an important result of U. S. Royal's 4-Year Truck Tire Project, is increasing service life and reducing equipment downtime for leading construction men like Mr. Parker.

Good reasons, too! The Con-Trak-Tor's Nylon cord carcass stands up to vicious shocks, fights off rocks and snags. It has triple impact protection—extra rubber between plies, double shock-pads under the tread, extra-tough con-

struction at the crown. Its full lug traction pulls right through toughest going, just won't bog down.

Why not let the U. S. Royal Con-Trak-Tor increase your tire service, reduce your downtime, lower your operating costs? Your U. S. Royal Dealer has this great tire in your size. Have him put it on your wheels—and prove to yourself why construction men like Mr. Parker report they're *well ahead* with U. S. Royal!



U.S. ROYAL

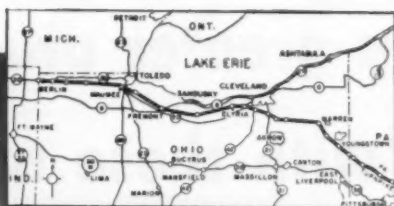
NYLON CON-TRAK-TOR

FULL LUG

... for more details circle 249, page 16

ROADS AND STREETS, July, 1955

Another Cleaver-Brooks Mobile Boiler in action: Portable steam proves best...



for pile driving on
Ohio Turnpike

THE Ohio Turnpike is making headline news because contractors are using up-to-the-minute methods across the board. And portable steam, furnished by Cleaver-Brooks boilers, is winning acclaim. It *guarantees the most practical, economical way* to drive piles for many of the 282 scattered structures along the way. Here's why:

Goes anywhere wheels can roll — No trailer expenses. Tows to any site. Built for "rough and tumble" service.

Fast hook-up — Standard fittings for steam, water and fuel. Gasoline-engine or electric powered. Light-oil fired. All-weather protected. Carries own fuel oil supply.

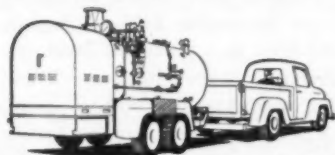
Fast steaming — Full head of steam in 30 minutes or less from a cold start. Constant steam pressure through automatic low and high fire operation. Nationally-known safety and operating controls are standard.

Fuel-saving 80% efficiency — Guaranteed 80% efficiency from full load down to 30% of rating. Guaranteed better than 99% dry steam under actual test.

No special operator needed — Cleaver-Brooks provides initial starting service — also trains operator in maintenance.

BOILER CAN BE SET UP A FEW FEET FROM HAMMER
Keeps steam lines short . . . assures constant pressure for smooth, powerful hammer action. Operation is clean, smokeless.

"GO-ANYWHERE HANDYMAN" KEEPS BUSY ON SCORES OF ALL-YEAR JOBS



Built with the famed Four-Pass High Efficiency Design
by the originators of the self-contained boiler

Two models are available: 80 and 125 hp, 150 lbs. working pressure, trailer or skid-mounted. You'll find wide usage for extracting, asphalt plant, ready-mix, winter concrete operations, thawing and miscellaneous heating. Write for a copy of Catalog RM-108. Cleaver-Brooks Co., Dept. H, 395 E. Keefe Ave., Milwaukee 12, Wis.



Cleaver Brooks

. . . for more details circle 181, page 16

ROADS AND STREETS, July, 1955

How new principles in **PAYLOADER®** design mean greater production at lower costs with these new models



Penetration

Full engine torque applied through torque converter and four-wheel-drive gives powerful, sure traction to penetrate hard-digging materials, even under slippery and loose ground conditions. Operator can also vary the digging angle of the bucket during penetration to meet any condition.



Pry-out action

Tremendous pry-out force can be exerted when necessary by using the break-out pads on the ground as a fulcrum for leverage. Load forces opposing the pry-out action are transferred to the ground through the pads instead of to the axle, wheels and hydraulic system.



Break-out action

The remarkable new system of bucket motion tips the bucket back 40 degrees at ground level in a powerful break-out action that gets heaped loads quick and easy, even in shallow cuts and low piles. Tilt-back action can be slow or fast at the will of the operator.

Incorporating an entirely new principle of bucket action, these new "PAYLOADER" tractor-shovels deliver more yardage per shift . . . handle heavier digging and are easier and safer to operate than any tractor-shovel of comparable bucket capacity. They pack more horsepower and have longer wheelbases for greater stability and riding comfort. They have easy, responsive power-steering, torque converter

drive, 4-speed full-reversing transmissions and powerful hydraulic brakes.

THE FRANK G. HOUGH CO. presents these 2 new "PAYLOADER" tractor-shovels as the finest ever offered in its 35 years of pioneering and leadership in the tractor-shovel industry. So why not set a date and have your "PAYLOADER" Distributor demonstrate.

model **HH**

1 ½ CU. YD.

model **HU**

1 CU. YD.



Stability and balance

You get heaped loads and — most important of all — you *deliver* bigger payloads because the bucket carry position is at full 40-degree tip-back *just off the ground* — low and in-close. The result is minimum spillage plus maximum balance and stability for fast, safe load delivery.



Driver safety, comfort

Underslung boom-arm design and positioning keeps moving members out of operator's reach at all positions. This eliminates the need for safety guards or screens and increases operator visibility. Longer wheelbase and adjustable molded foam rubber seat contribute greatly to riding comfort and ease of operation.

"PAYLOADER" is the registered trademark for tractors and tractor-shovels made by The Frank G. Hough Co. — pioneers and builders of more unit-design tractor-shovels than all other manufacturers combined. "PAYLOADER" units are sold and serviced by the largest, most experienced Distributor organization in the business.



PAYLOADER®

MANUFACTURED BY
THE FRANK G. HOUGH CO. LIBERTYVILLE, ILL.

SUBSIDIARY—INTERNATIONAL HARVESTER COMPANY



THE FRANK G. HOUGH CO.
762 Sunnyside Ave., Libertyville, Ill.

- ☐ Send data on Model HH — 1½ cu. yd.
- ☐ Send data on Model HU — 1 cu. yd.

Name.....
Title.....
Company.....
Street.....
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... for more details circle 207, page 16

LOOK HOW THEY'RE DIGGING ON RUBBER TODAY!

MOTO-SHOVEL



MOTO-DRAG



MOTO-HOE

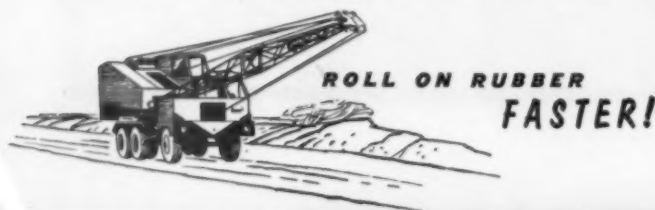


Rubber-tire excavators have grown up! Today, Lorain Moto-Shovels, Moto-Dragas and Moto-Hoes are full-size digging machines that enable you to do real, man-size, big production jobs. The same mobile, high-speed rubber-tire advantages that have paid off for years on lifting crane uses can now make the dirt fly on excavation jobs.

Lorain rubber-tire excavators are not light-weight machines designed for occasional or secondary digging jobs. They are "he-man" machines with work capacity to tackle any job. Booms are the same sturdy design and construction as on crawler machines; dipper capacities, through the 1-yard class, enable you to put rubber to work on the majority of excavating contracts. Most important, Lorain Carriers are provided with multiple turntable mounting positions which enable you to move the turntable to a rear position to provide proper clearances for efficient digging over the rear of the machine. Multiple tires, soft-ground flotation and high-tractive effort enable these machines to leave the roadways and move right in where digging jobs are to be found.

Whether it be a shovel, dragline or hoe application, your local Thew-Lorain Distributor can show you the extra-profit opportunities you enjoy when you "dig on rubber" with a Lorain.

THE THEW SHOVEL CO., LORAIN, OHIO



THEW LORAIN®

B.F. Goodrich



All-Nylon All-Purpose tires roll 55,000 miles for building materials company

HIGHWAY, shopping center, housing development, industrial plant — all types of construction use concrete and a host of other materials from Hilltop Building Materials, Inc., of Cincinnati. 100 ready-mix trucks, 20 dump trucks and 6 flat bed trucks range over southwest Ohio highways, on rock and rut-choked roads, as often on no roads at all.

That's why Hilltop uses B. F. Goodrich *all-nylon* All-Purpose tires. The report: *all-nylon* All-Purpose tires can be recapped, give up to 55,000 miles of service.

All-Nylon body

Nylon is stronger than ordinary cord materials, withstands double the impact and resists heat blowouts and flex breaks. B. F. Goodrich *all-nylon* All-Purpose

tire body outwears even the extra-thick tread—up to 67% deeper than that of a regular tire, can still be recapped over and over!

Put an end to unnecessary tire failures and costly maintenance. See your B. F. Goodrich retailer now and find out how *all-nylon* All-Purpose and other off-the-road tires can save you money. (Also available in lower-cost rayon construction.) Look under Tires in the Yellow Pages of your phone book or write The B. F. Goodrich Co., Tire & Equipment Div., Akron 18, Ohio.

Specify B. F. Goodrich tires when ordering new equipment.



"ALL-PURPOSE TIRES give excellent traction and clean very well," says Hilltop Fleet Superintendent Edgar Pitzer.

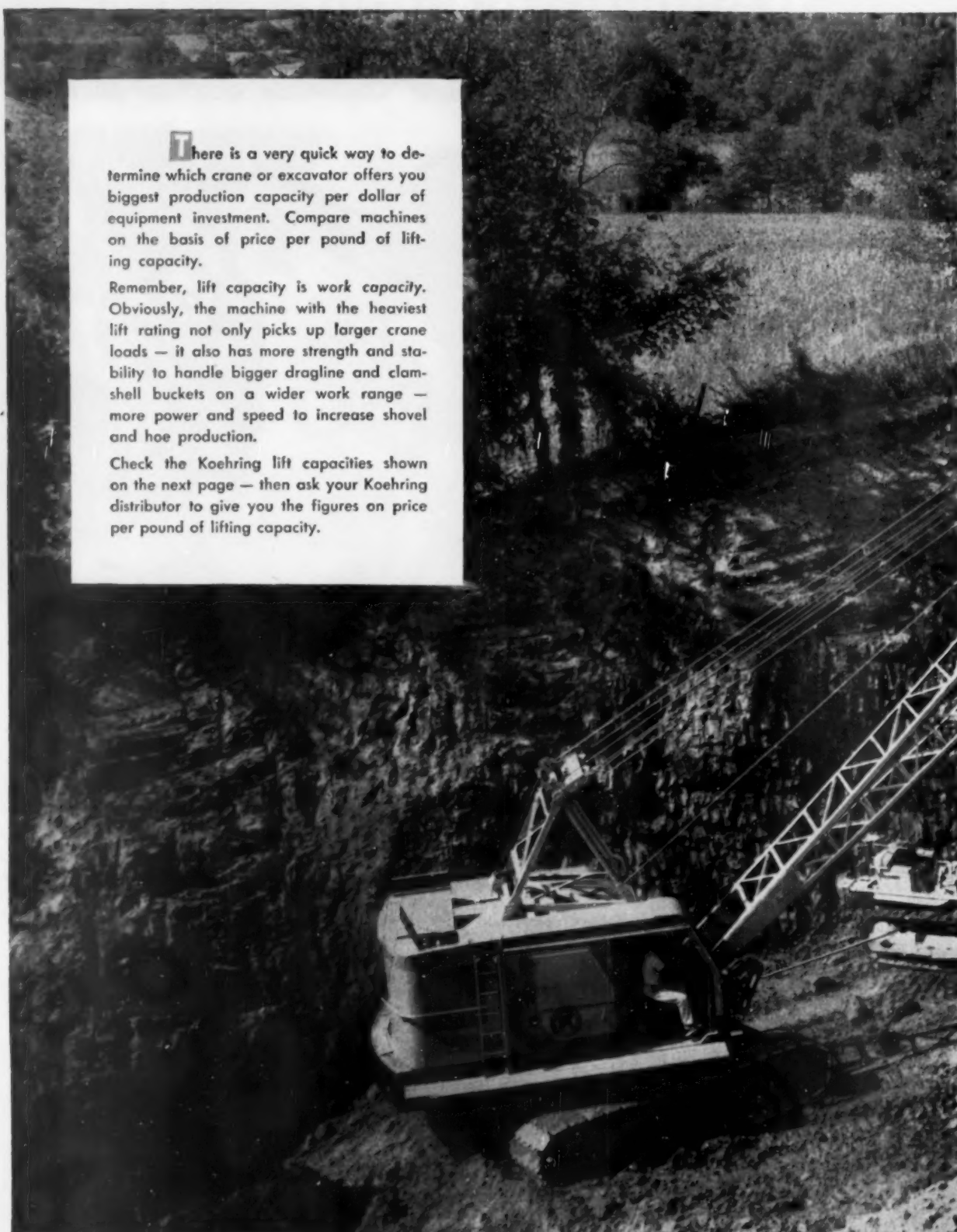
... for more details circle 198, page 16

ROADS AND STREETS, July, 1955



A 20-TON LOAD of concrete at a construction site. Hilltop gets a longer run-per-dollar from *all-nylon* tires.



A black and white photograph of a large crane, likely a crawler crane, positioned on a steep, rocky hillside. The crane's boom is extended upwards and to the right, with several cables visible. The background shows a rugged, forested hillside. The crane is the central focus of the image, demonstrating its capability to operate in challenging terrain.

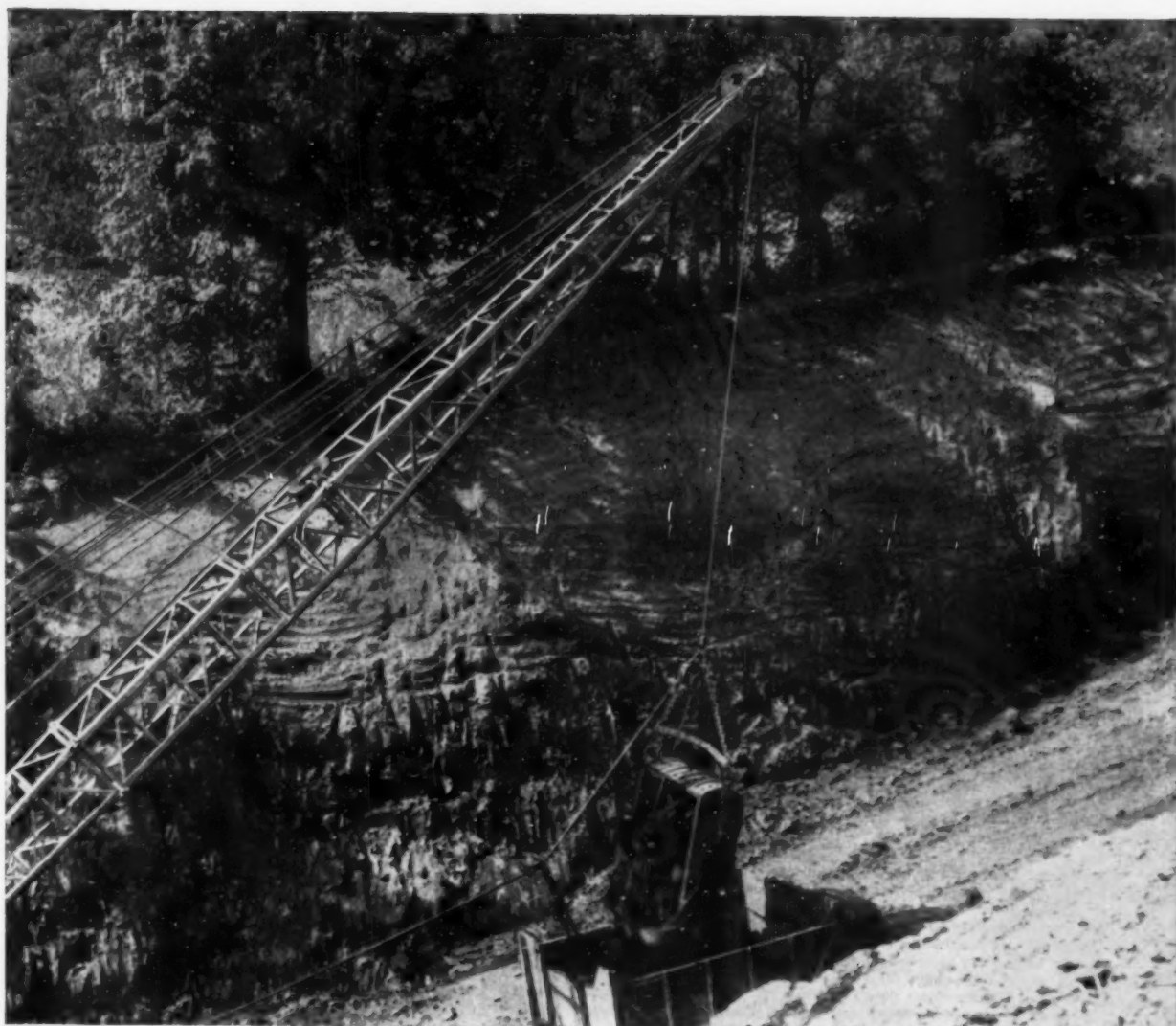
There is a very quick way to determine which crane or excavator offers you biggest production capacity per dollar of equipment investment. Compare machines on the basis of price per pound of lifting capacity.

Remember, lift capacity is work capacity. Obviously, the machine with the heaviest lift rating not only picks up larger crane loads — it also has more strength and stability to handle bigger dragline and clam-shell buckets on a wider work range — more power and speed to increase shovel and hoe production.

Check the Koehring lift capacities shown on the next page — then ask your Koehring distributor to give you the figures on price per pound of lifting capacity.

KOEHRING COMPANY Milwaukee 16, Wis.

Subsidiaries: JOHNSON
PARSONS • KWIK-MIX



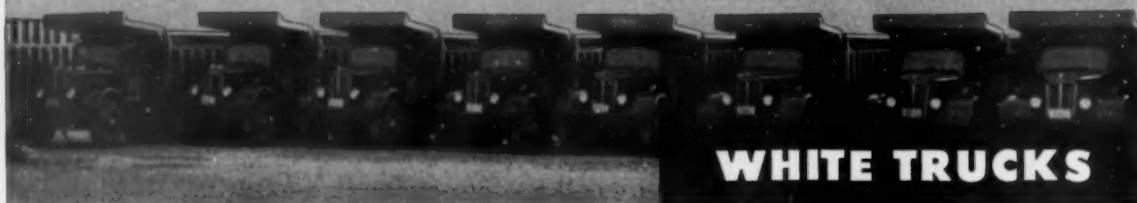
**Check price
per pound
of lifting
capacity**



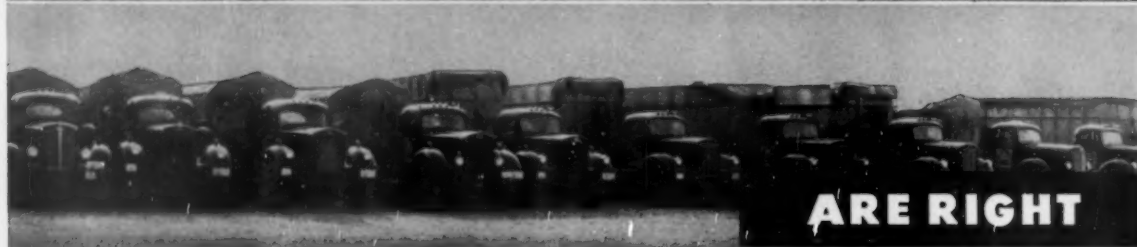
KOEHRING MODEL	SIZE DIPPER	KOEHRING LIFT CAPACITIES (Crawler ratings based on 75% of tipping load. Rubber-tired machines — 85% of tipping load)		PRICE PER POUND OF LIFT CAPACITY*
205 CRAWLER	½-Yd.	20,000 lbs.	30-foot boom at 10-ft. radius	?
205 ON RUBBER	½-Yd.	30,000 lbs.	25-foot boom at 12-ft. radius	?
304 CRAWLER	¾-Yd.	27,800 lbs.	35-foot boom at 12-ft. radius	?
304 ON RUBBER	¾-Yd.	50,000 lbs.	30-foot boom at 10-ft. radius	?
405 CRAWLER	1-Yd.	40,000 lbs.	40-foot boom at 12-ft. radius	?
605 CRAWLER	1½-Yds.	72,300 lbs.	50-foot boom at 12-ft. radius	?
1005 CRAWLER	2½-Yds.	159,000 lbs.	50-foot boom at 12-ft. radius	?

*Figures available on request—ask your Koehring distributor for them.

Speed Delivery of Lightweight Slag at Hamilton because...



WHITE TRUCKS



ARE RIGHT



FOR THE RUGGED JOBS!

Look at this line-up of rugged Whites engineered right to the job for the Quigley Construction Company Limited at the new National Slag Ltd. plant at Hamilton. They transport thousands of tons of slag hourly in southwestern Ontario... on tight schedules... day after day.

Their outstanding record on constantly expanding service proves Whites have the quality and the engineering that gets more work done... faster!

Find out how you can have this same White dependability and low operating costs... have bigger payloads... do more work... in your business. See your White Representative.



One of the White six-wheeler dump trucks with 18 cu. yd. body (14' x 7') in the Quigley fleet.

"We tailor our Whites to the exact work they do... and they do more of it!"



... Robert P. Quigley, President, Quigley Construction Company Limited Bartonville, Ont.

"Over four years ago, we agreed to standardize on Whites," President Quigley says. "This move has paid off time after time in actual performance and economy of operation."

"Our drivers are as proud of our Fleet of Whites as we are, and this combination of quality in men and machines is a sure-fire one," he says.

Through city traffic, over-the-highway, and off-the-road, Whites are right for Quigley operations—from their Model WC-2262 dump trucks with 18 cu. yd. bodies, to the husky WC2462 PLT tractors with 32 cu. yd. dumping semi-trailers.

THE WHITE MOTOR COMPANY
Cleveland 1, Ohio

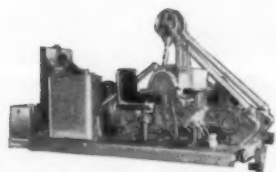
For More Than 50 Years The Greatest Name In Trucks



... for more details circle 251, page 16
ROADS AND STREETS, July, 1955



Comparison proves the **MICHIGAN** $\frac{3}{8}$ -yd. Truck Hoe **YOUR BEST BUY**



Upper Mechanism

The MICHIGAN® TM-6 is a heavy duty $\frac{3}{8}$ yd. $7\frac{1}{2}$ ton upper mechanism for mounting on your own truck or at the factory on a new 6x4 or 6x6 truck. The TM-6 is available on the Clark Lease Plan. Write for Bulletin 111.



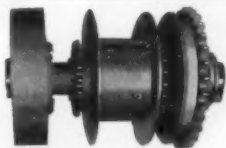
Power Control

Air Controls are standard on all MICHIGANs . . . fast, smooth, precise, with low operator fatigue. No heavy levers to push or pull—air rams do the actual work.



Smooth Clutches

There's nothing smoother than MICHIGAN air-operated segmented disc clutches . . . and they are self-compensating for heat, self-ventilating and self-cleaning. All segments are interchangeable.



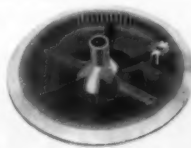
Power Load-Lowering

Four shafts on the TM-6: Swing, Hoist, Intermediate and Crowd . . . each with its independent clutches. For precision crane work, the hoist line can be reeved on the front drum to provide Power-Up and Power-Down.



Hook Rollers

You can swing the boom by leaning against it. There are 5 ball bearing-mounted adjustable rollers on the TM-6 . . . grease twice a year. Most other $\frac{3}{8}$ -yd. machines have only 3 rollers, bushing-mounted.



Cast Steel Circle Gear

Center post and circle gear is heavy one-piece casting of alloy steel. Pinion gear is cut from alloy steel for smooth, quiet operation. Roller paths are machined to a smooth finish, top and bottom.

Write for 12-page booklet, "More Yardage through Air Power" which documents the operating and maintenance advantages of MICHIGAN air controls.

. . . for more details circle 180, page 16

**CLARK
EQUIPMENT**

CLARK EQUIPMENT COMPANY

Construction Machinery Division

394 Second Street, Benton Harbor 31, Michigan

Phone: WA 6-6164

Any Truck Can **PULL** More Than It Can Carry

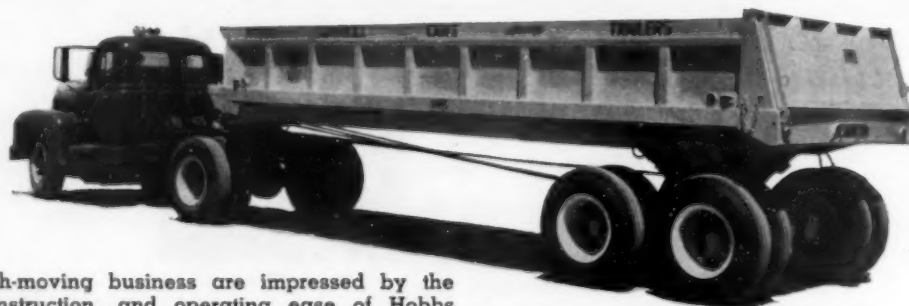


The use of a trailer to increase the hauling capacity of a truck is as simple as child's play. This principle enables your truck to **PULL** much more load than it could ever carry. Because of this . . .

HOBBS Schonrock Cable Dump TRAILERS **CAN TRIPLE YOUR TRUCK EFFICIENCY**

A truck equipped with Hobbs Schonrock Cable Dump Trailer hauls three to four times as much dirt, sand, gravel or aggregate as one equipped with a dump body. The yard-mile **SAVING** is made even greater because the Hobbs Schonrock Cable Dump Trailer does away with heavy, expensive and intricate hydraulic lifting equipment. The simple, time-tested method of increasing power by means of block and tackle makes Hobbs Schonrock Cable Dump Trailer high in efficiency, low in cost, simple in maintenance.

*Permits full
Advantage of
Your State
Bridge
Formula
Laws*



- REDUCES MAINTENANCE AND FUEL COSTS
- PUSHES ITSELF OUT OF MUD
- DUMPS EASILY AT ANY ANGLE
- GREATER GROUND STABILITY
- AUTOMATIC TAIL GATE
- EASIER TO MANEUVER
- INCREASES YOUR PROFITS

Men in the earth-moving business are impressed by the capacity, rugged construction, and operating ease of Hobbs Schonrock Cable Dump Trailers. Tandem axle model (above) is designed for legally hauling full gross load capacities. Single axle model (below right) provides fast delivery and easy maneuvering in close quarter operation. Batch gate permits multiple dumps.

TANDEM AXLE MODEL

Distributorships Available
WRITE, WIRE OR PHONE COLLECT

SINGLE AXLE
MODEL



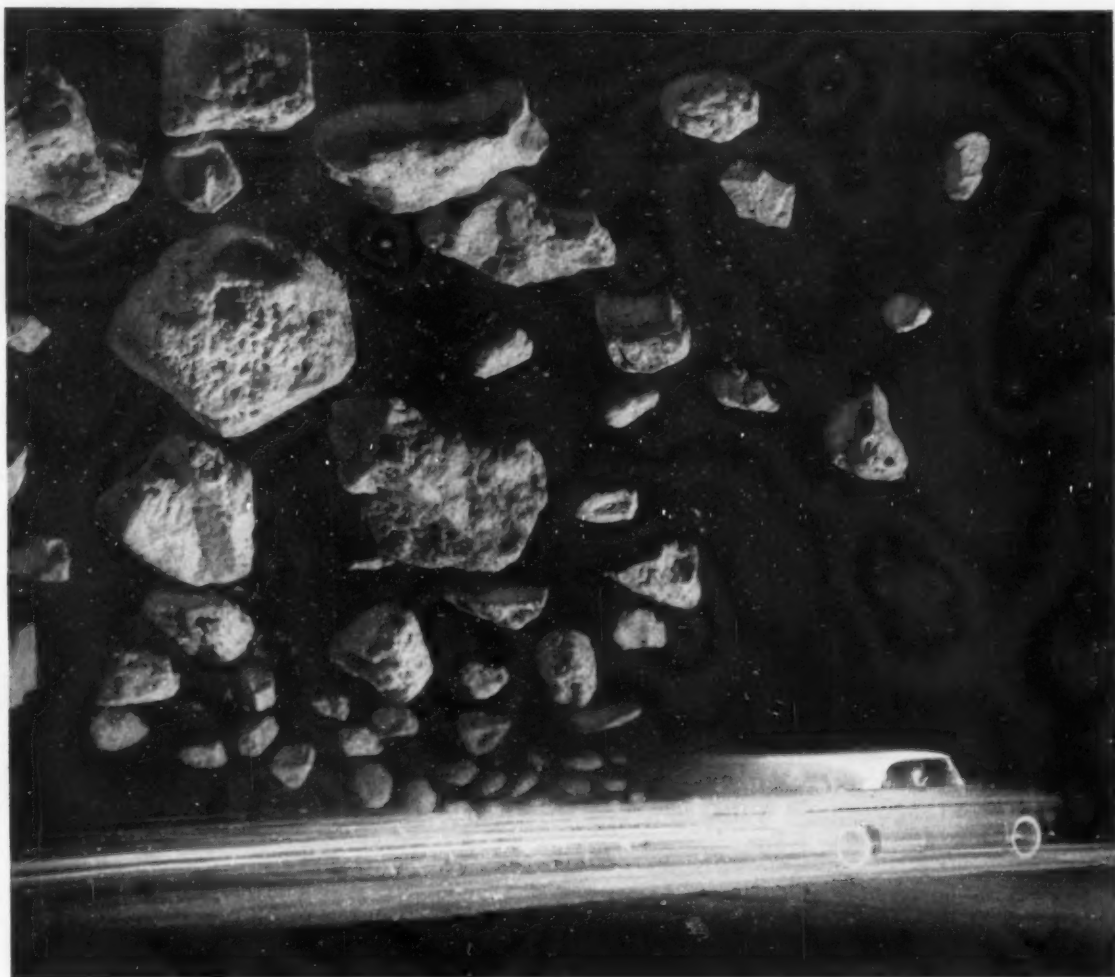
HOBBS MANUFACTURING CO.

609 North Main St. Fort Worth, Texas

Sales and Service also in Houston, San Antonio,
Lubbock, Dallas, El Paso, Oklahoma City,
Wichita, Kansas and Lincoln, Nebraska.



... for more details circle 204, page 16
ROADS AND STREETS, July, 1955



Keep that Gravel Grounded !

Stabilize your roads with Morton Salt

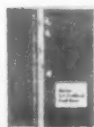
- Cut aggregate loss
- Save man-hours and maintenance money
- Reduce accidents caused by loose gravel

Gravel roads stabilized with Morton Salt give more service per dollar than roads built by any other method. (Savings in aggregate alone more than pay for the salt.) You get smooth, durable, water-repellent surfaces that require minimum maintenance.

Stabilizing the base course of primary roads with Morton Salt helps prevent the 9 out of 10 road failures which result from faulty foundations.

... for more details circle 226, page 16

ROADS AND STREETS, July, 1955



Send for this free book on how
Morton Salt helps you build
better roads at far less cost!
Mail this coupon today!

MORTON SALT COMPANY

Industrial Division, Dept. RS-7

120 So. LaSalle Street, Chicago 3, Illinois

Please send me your free booklet on salt
stabilized roads.

Name _____

Title _____

Address _____

City _____ County _____ State _____



MIANUS RIVER DAM and Reservoir, Greenwich, Fairfield Co., Conn., for Greenwich Water Co. Merritt, Chapman & Scott Corp., Contractors; American Water Works Service Co. Inc., Phila., Pa., Consulting Engineers; DeLeo Bros., Inc., Stamford, Conn., Excavation Sub-contractors.

On Mianus River Dam, Greenwich, Conn.

IT'S MACKS 100%

This project, which is being built to insure an adequate water supply for Greenwich, Conn., Port Chester and Rye, N. Y., involves moving 375,000 cubic yards of earth and rock fill.

The dam itself will be 1,200 ft. long, 77 ft. high, 430 ft. across at the base and 20 ft. across at the top. As Mr. Sam DeLeo of DeLeo Bros., Stamford, Conn. excavation contractors, puts it, "We've got a real earth-moving job here, all right."

"To do the best job, and to be sure we fulfill our contract on schedule, we're relying on Macks.

"Ours is a Mack fleet, exclusively. Moreover, the additional trucks we've hired to increase our hauling capacity on this job are Macks. In fact, with us, it's Macks all the way."

DeLeo Bros., like so many heavy construction contractors, have used Macks for years. They know that Macks keep cycle time down over the toughest terrain. Fast, uninterrupted schedules are assured, thanks to Mack's Balanced Bogie and exclusive Power Divider . . . the combination that provides maximum flexibility, even tire loading, uniform braking and positive traction in soft or slippery going.

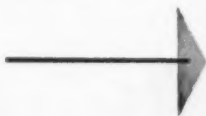
In addition, the fact that Mack makes more of its own components than any other manufacturer means that Macks are built better from the axle up. They're stronger, require less maintenance, assure longer service life. As Mr. DeLeo says: "It pays to invest in Macks."

MACK TRUCKS Empire State Building, New York 1, N. Y.

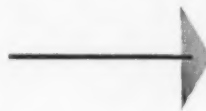
3130

. . . for more details circle 224, page 16

Through a river
in Colombia . . .



Through a city
of 237,000 . . .



Tournapull Rear-Dump hauls gravel for new stadium

In the city of Medellin, Republic of Colombia, this 18-ton Tournapull Rear-Dump travels a difficult route while hauling construction materials to the new municipal stadium.

First, the Rear-Dump is driven through water 1.6 to 2.6 ft. deep to

be loaded with river-run gravel and sand needed for the stadium's concrete construction. Water often covers rig's undercarriage during these trips, but this has not harmed, or even affected, the electrical control system or brakes. Despite this loading in water, in more than 2,000

hours of service, machine has needed practically no repairs.

Once out of the river, haul road leads through Medellin, a city of 237,000 people. Easy maneuverability and powerful four-wheel air brakes allow Rear-Dump to drive along busy thoroughfares without delaying normal traffic or endangering other vehicles. Rear-Dump has traveled city streets for two years, and has never been involved in an accident.

Whenever you have earth to move, investigate the many advantages offered by modern LeTourneau-Westinghouse equipment. Ask your local Distributor to give you facts and figures on the size Tournapull Rear-Dump you need—9, 18, 35, or 50 tons. He is always at your service.

Here's what city officials think of their Tournapull Rear-Dump

Dr. Jorge Ortiz Rodriguez
Mayor, City of Medellin

"We are satisfied with our Tournapull which has given us uninterrupted service for approximately two years. Cost of operation is so low that we are considering purchase of an additional unit. Safety feature of the 4-wheel air brakes permits use in our city without danger or interruption of traffic flow."

Dr. Alberto Puerta-Puerta
Chief Engineer, City of Medellin

"Tournapulls and their ability to operate in wet conditions, such as river bottoms where they can obtain large loads of heavy, water-filled pit-run gravel and sand, have proven to be one of the solutions to our problem in Medellin. Maneuverability and radius of turning is a great factor of safety for haulage through the city."

Dr. Francisco Eladio Gomez
Director of Purchases, City of Medellin

"Under conditions of haulage through river bottoms in water, and heavy loads of gravel and sand, consumption of spare parts and tire replacement have been astoundingly low. Little or no troubles have been experienced with electrical mechanisms, and operators are satisfied with the machine."

**LeTourneau-Westinghouse
Company**

PEORIA  ILLINOIS

A Subsidiary of Westinghouse Air Brake Co.
Tournapull—Trademark Reg. U.S. Pat. Off. R-383-B-b

Why Creeper Gears in a motor grader?



Let your ADAMS dealer show you!

● Every grader operator has wished at times that he could slow down his grader below standard first speed without slipping his clutch or reducing his engine power. Adams creeper gears are the answer. They permit operating speeds as low as 4/10 mph with engine wide open—1/4 mph with engine cut back.

These extra-low speeds are advantageous in heavy scarifying of asphalt (as pictured above), in fine finishing, working in close quarters, grading among hidden rocks and roots, working mountain roads, etc. They gear the grader to the job. Tire slippage and shocks are reduced. They eliminate all operator tendency to slip the clutch, thus increasing clutch life.

Ask your local Adams dealer to show you a movie picturing the advantages of creeper gears and other Adams operating features—such as 8 standard forward speeds, 4 reverse speeds, dual braking system, etc. In no other graders do you get all of these time-saving, work-producing advantages.

ADAMS DIVISION • LeTourneau-Westinghouse Company, Indianapolis, Indiana



ADAMS Creeper Gears (Optional)

Provide speeds from 1/4 to 1 3/4 mph.

MILES PER HOUR		1	2
CREEPER SPEEDS	1st		
	2nd		
	3rd		

Optional in new machines, Adams creeper gears are also easily installed in any Adams Motor Grader with constant-mesh transmission in the field. With them you get an effective speed range of from 1/4 to 26 mph.—a correct speed for any and every grading job.

*Make your next
motor grader an*



47% advantage for rubber over tracks



**Widening road to Ohio Turnpike,
7-yd. Tournapull averages 60 yds. per hour.
Slower 11-yd. crawler-scrapers average only
41-yds. in spite of 400 ft. shorter cycles.**

	122 hp, 7-yd. D Tournapull	93 hp crawler, 11-yd. scraper	148 hp crawler, 11-yd. scraper
Load time self-loading sandy clay (all units in same pit)	1.2 Min.	Not timed	Not timed
Total cycle time	4.5 Min.	12.7 Min.	10.3 Min.
Haul distance one-way	1100'	1100'	1100'
Return distance	1500'	1100'	1100'
Return speed on 1000' of paved road in traffic:	14 MPH	Could not haul on pavement	
Top speed possible	28 MPH	6 MPH	5 MPH
Trips per 55-minute hour	12	4½	5½
Yards per 55-minute hour	60	38	44

The above figures are averages of a day-long time study made by field engineers on Kane, Ohoro & Haenny, Inc. 8-mile road widening job between Youngstown and the Ohio Turnpike. The 47% advantage computed for the Tournapull was called "conservative" by the contractors. Based on their experiences on Turnpike

subcontracts, they estimate the one "D" will move as much dirt, over-all on this job, as two crawler-drawn scrapers combined. And here's another advantage...

D Tournapull hauls on blacktop where crawlers can't travel

Most of the time, rubber-tired "D" traveled down the 3-lane blacktop highway, spread its sandy-clay loads along either shoulder. Its high speed on rubber, plus fast-acting 4-wheel air brakes and power steer, allowed the rig to travel safely and fast through open traffic. The crawler-scrapers, on the other hand, could not haul on the pavement, and therefore had to spread all their loads on shoulder on same side of road as borrow pit.

Comparing the two dirtmovers, Company Partner Albert Haenny says, "On 90% of your work you're better off with the D Tournapull. Even on short hauls, the smaller 'D's' will move almost as much dirt as bigger units when you average it out."

Superintendent Paul Ellis agrees. "I like many things about D Tournapulls," he says. "They can travel across the road without planking and work both sides. They're fast and can get around where other rigs can't. They're worth their weight in gold on road jobs like this one."

For low-cost dirtmoving, investigate Tournapull maneuverability and 28 mph speed for yourself. Write or call us for a demonstration on your job. See for yourself what the "D" can do...either self or pusher-loaded...alone on scattered odd jobs or in fleets on big-yardage assignments.

Tournapull—Trademark Reg. U.S. Pat. Off. DP-709-H-b

Send to: LeTOURNEAU-WESTINGHOUSE COMPANY, Peoria, Illinois

Your Name

Title

Company

Address

(Street, City, State)

DP-709-H-b



Now available — FREE — a valuable new reference book — "Earthmoving, An Art and a Science". Contains 60 pages of detailed information on how to increase output and lower dirtmoving costs. Unbiased. Written by experienced field engineers ... checked by veteran dirtmovers. For your free copy, call your Distributor or write to LeTourneau-Westinghouse Company, Peoria, Illinois.

... for more details circle 219, page 16

A TWIN DEAL

that equips
you for any
**BLACK TOP
PAVING
JOB**

HERE is a combination that makes money on any size bituminous paving job you are faced with. The Blaw-Knox PF-90 Bituminous Paver Finisher has proved itself the last word for highway specification work. It will outproduce any other asphalt finisher on the market today. Wheel operation eliminates the 500 to 700 parts characteristic of crawler design and pneumatic tires absorb the irregularities in the subgrade leaving a smooth, clean sheet of pavement. Rugged construction built around a rugged frame of unusual design eliminates the constant rebuilding and its attendant costs. This is only part of the story that is making contractors replace present equipment. There is a new catalog that is yours for the asking.

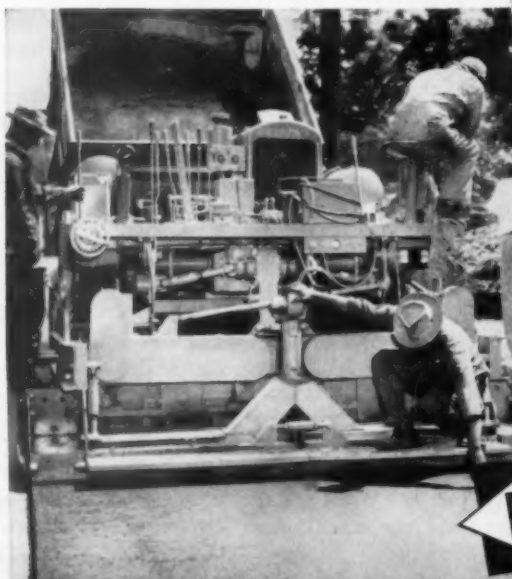
BLAW-KNOX COMPANY

*On wheels
it will pave
for less*

HERE is the finest thing in tow-type asphalt spreading equipment. The Adnun Jr. is built for years of service and the overlapping oscillating screed combined with the Adnun feature of Continuous Course Correction assures a smoother course with tighter longitudinal joints.

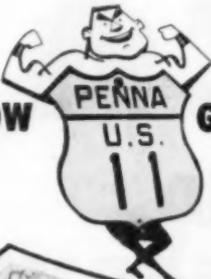
The Adnun is built on a sturdy, box frame. All bearings are anti-friction. Transmission has cut gears with shafts on anti-friction bearings, all running in an oil bath. Dual controls are standard and power is available for moving the empty paver, permitting it to relocate itself without waiting for trucks or wasting truck time. If you are bidding on parking lots, driveways, playgrounds and similar jobs, the Adnun Jr. will give you high output at low cost. Ask for the new catalog.

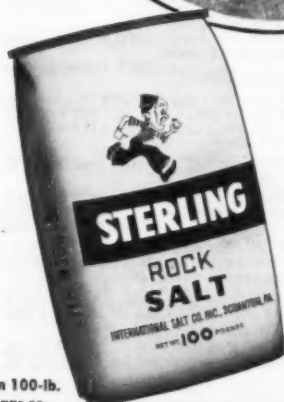
CONSTRUCTION EQUIPMENT DIVISION
1936 State Street • Nunda, N. Y.



BLAW-KNOX

ASPHALT AND CONCRETE PAVERS

HOW  **GOT A PAIR OF HARD SHOULDERS WITH**
STERLING ROCK SALT



In 100-lb.
bags or
in bulk

STERLING ROCK SALT STABILIZATION
quick . . . economical . . . less maintenance

Sterling Rock Salt stabilization produces safe, all-weather shoulders that have high density, reduced frost heave, reduced loss of material, and reduced dust. Their initial and maintenance costs are low. These shoulders may be constructed with equipment which is usually readily available.

To place an order, or for more information about soil stabilization, communicate with International Salt's nearest sales office.

INTERNATIONAL SALT COMPANY INC.
 Scranton 2, Pennsylvania

SALES OFFICES: Atlanta, Ga. • Chicago, Ill. • New Orleans, La. • Baltimore, Md. • Boston, Mass. • Detroit, Mich. • St. Louis, Mo. • Newark, N. J. • Buffalo, N. Y. • New York, N. Y. • Cincinnati, O. • Cleveland, O. • Philadelphia, Pa. • Pittsburgh, Pa. • Richmond, Va.

ENGINEERING OFFICES: Atlanta, Ga. • Chicago, Ill. • Buffalo, N. Y.

... for more details circle 209, page 16
ROADS AND STREETS, July, 1955

AMERICAN

AUTHORIZED

FUEL INJECTION SERVICE

Faithful, economical performance of Diesels equipped with American Bosch Fuel Injection Systems is backed by a world-wide fuel injection service organization . . . staffed with factory-trained technicians . . . using the latest and most efficient methods . . . working with highly specialized equipment designed and built to American Bosch exacting standards.

All this adds up to fast accurate repair work that

saves time and money for owners of American Bosch-equipped Diesels. Cost-conscious operators appreciate American Bosch standards that assure them dependable performance and convenient facilities for prompt, reliable servicing.

To find the name of the authorized American Bosch fuel injection service station nearest you in the U.S.A. and Canada, check the directory below:

DIESEL FUEL INJECTION SERVICE STATIONS

ALABAMA	
Birmingham, 3	Birmingham Electric Battery Co. Ave. B & 23rd St. S.
ARIZONA	
Casa Grande	Diesel-Electric Service Co. 202 E. Main St.
Mesa	Perkins Diesel Service 747 South Country Road
Phoenix	Charlie C. Jones Battery & Electric Co. 318-322 W. Jefferson St.
Tucson	Auto Plane Electrical Service 1037 South 6th Ave.
Yuma	Yuma Automotive Electric 229 8th St.
ARKANSAS	
N. Little Rock	Womack Bros. & Taylor 1219 E. Broadway
CALIFORNIA	
Bakersfield	Automotive Diesel & Electric Co., Inc. 1017 30th St.
Calico	Calico Pump & Magneto Co. 115 East Third St.
Eureka	Gustafson Diesel & Electric 5th & Commercial Sts.
Fresno	Winther Bros. 512 Divisadero St.
Los Angeles	Diesel Precision Company, Inc. 4847 Anaheim Telegraph Rd.
Los Angeles, 21	Magneto Sales & Service Co., Inc. 751 Towne Ave.
Oakland	Diesel Injection & Governor Serv., Inc. 365 Seventh St.
Oakland	Pimental & Son 401 Eighth Ave.
Sacramento	Diesel Pump & Injector Service 414 16th St.
Sacramento, 8	Langner & Rifkin 1116-22 15th St.
Salinas	Haag Diesel & Electric 137 Abbott St.
San Bernardino	Diesel Injection Service 532 Mill Street
San Diego	Electric Diesel & Equipment Co. 1268 Kettner Boulevard
San Francisco, 24	McKinley Corporation of California 2196 Palou Ave.
South Gate	Diesel Fuel Injection Lab. 5775 Meadow Road
Wilmington	Diesel Control Corp. 218 N. Marine Ave.
COLORADO	
Denver, 3	Central Supply Company 1171 Lincoln St.
CONNECTICUT	
Hartford	W. J. Connell Co. of Hartford 85 Airport Road
DISTRICT OF COLUMBIA	
Washington	Diesel & Ignition Service Inc. 925 Girard St., N. E.
FLORIDA	
Jacksonville	Patten Sales Co., Inc. 1021 Hogan St.
Miami	Dade Diesel Company 3280 N. W. South River Drive
Miami, 36	Florida Diesel Service Co. 1930 N. Miami Ave.
Orlando	Interstate Diesel Service 306 N. Orange Blossom Trail
Tampa	Stuart Diesel Service 2109 4th Ave.
GEORGIA	
Atlanta, 3	Auto Electric & Magneto Co. 477 Spring St., N. W.
Cairo	Gaddy Motors 201-5th St., N. E.
IDAHO	
Blackfoot	Auto Parts Service Co. 95 S. Broadway
Boise	Magneto & Diesel Supply Co. 2406 Main St.
Lewiston	Osterman Diesel & Electric Co. 1610 E. Main St.
Twin Falls	Diesel Pump & Injector Service West Madison Avenue at Raman Lodge
ILLINOIS	
Chicago, 16	Illinois Auto Electric Co. 2011-37 So. Indiana Ave.
Peoria	Automotive Ignition Co. 522 Franklin St.
Rock Island	Lohse Automotive Service 430 17th St.

INDIANA	
Indianapolis, 4	Gulling Auto Electric Inc. 450 N. Capitol Ave.
Mentone	Smith Brothers Garage
IOWA	
Cedar Rapids	Hogan's Carburetor & Electric Co. 209 Seventh St., S. E.
Des Moines	Electrical Service & Sales Co. 1313 Walnut St.
KANSAS	
Great Bend	Bell Engine Service 3810 West Tenth
Grinnell	Grinnell Electric & Diesel Service Co.
Salina	The Motor Service Company 8th & Pacific
Wichita, 2	E. S. Cowie Electric Co. 230 S. Topeka Ave.
KENTUCKY	
Louisville	Diesel Injection Service Shelby at Mulberry St.
Louisville	Schaaf Auto Electric Co. Broadway at Jackson
Paducah	Story Electric & Battery Co. 621 Jefferson Street
LOUISIANA	
Baton Rouge	Womack Bros. Diesel Service 3983 Airline Hgw.
Bossier City	Vaughan Tractor & Auto Parts Co. 601 West First Street
New Orleans	Gerhardt's Inc. 1917 Jefferson Hgw.
New Orleans, 13	John M. Walton, Inc. 1050 Carondelet St.
MAINE	
Portland	Eastern Diesel Service Co. 997 Congress St.
Portland, 5	Portland Tractor Co., Inc. 803 Forest Ave.
MARYLAND	
Baltimore, 1	Parks and Hull Automotive Corp. 1033 Cathedral St.
Baltimore	Stephen Sell & Co. 876 Park Ave.
MASSACHUSETTS	
Boston	Boston Fuel Injection & Engine Service 280 Northern Ave.
Boston, 64	W. J. Connell Company 210 Needham St.
Boston, 10	Wharf Machine & Electric Co., Inc. Fish Pier Road
Fairhaven	Hathaway Machinery Co., Inc. Hathaway-Braley Wharf
Springfield	C. A. Krohne & Sons 833 Columbus Ave.
MICHIGAN	
Detroit	Knorr-Maynard, Inc. 5743 N. Woodward Ave.
Lansing	Diesel Equipment Sales & Service 2520 S. Pennsylvania Ave.
MINNESOTA	
Hibbing	Diesel Service Company 1800 Third Ave., East
Minneapolis	Diesel Service Co. 2509 E. Lake St.
Minneapolis, 2	Reinhard Bros. Co., Inc. 11 South 9th St.
MISSISSIPPI	
Jackson	Womack Brothers 1305 South Gallatin St.
MISSOURI	
Kansas City, 8	Electrical & Magneto Service Co. 2538 Grand Ave.
St. Louis, 23	Diesel Fuel Injection Service Co. 9331 So. Broadway
St. Louis, 3	Electric Parts and Service Co. 2900 Washington Blvd.
MONTANA	
Billings	Original Equipment, Inc. 423 North Broadway
NEBRASKA	
McCook	Automotive Sales & Service 44 West "B" St.
Omaha, 2	Carl A. Anderson, Inc. 16th & Jones
NEW JERSEY	
Newark, 2	Tire Trading Company, Inc. 239 Halsey St.
Trenton, 6	Steinert Diesel Injection Service Bell Ave. off Klockner Rd.

B O S C H

*Keeps Diesels on the job
... everywhere
... anywhere*



AMERICAN BOSCH

Springfield 7, Massachusetts

Division of American Bosch Arma Corporation

2029

NEW YORK		
Brooklyn	A & D Diesel Service, Inc.	145—21st St.
Buffalo, 8	Hettrich Electric Service	1032 Ellicott St.
Hempstead, L. I.	A & D Diesel Service, Inc.	887 Nassau Rd.
Pelham Manor	Coretti-Gross, Inc.	44 Secor Lane
Rochester	Union Carburetor & Injection Service	6 Pitkin St.
Troy	Ehrlich Electric Service, Inc.	200 Fourth St.
Utica	Stiefvater Electric Co., Inc.	320-322 Lafayette St.
Woodside, 77	American Bosch Div. American Bosch Arma Corp.	34-21 56th St.
NORTH CAROLINA		
Charlotte	Carolina Rim & Wheel Co.	301 East 8th St.
Raleigh	Diesel Injection Sales & Service	3015 Hillsboro Road
NORTH DAKOTA		
Fargo	Northwestern Diesel Service Co.	2800 Front St.
Williston	Crighton Motor Co.	223 E. Broadway
OHIO		
Akron	Standard Motor Parts	200 Carroll St.
Cincinnati	Tri-State Distributing Corp.	Broadway at Eighth
Cleveland, 14	The Cleveland Ignition Co.	1301 Superior Ave.
Columbus, 15	Columbus Ignition Co.	211 Neilston St.
Lisbon	Lisbon Diesel & Supply Co., Inc.	234 East Washington St.
OKLAHOMA		
Okla. City, 2	American Electric-Ignition Co.	124 N. W. 8th St.
Tulsa	Magneto Ignition Company	701 West 5th St.
OREGON		
Klamath Falls	Specialized Service Co.	1434 Main St.
Pendleton	Eds Magneto & Diesel Co.	S. W. 18th & Court St.
Portland, 14	Automotive Products, Inc.	1700 Southeast Grand Ave.
Roseburg	Diesel Injection Service	2145 N. Stevens
PENNSYLVANIA		
Harrisburg	Penn Diesel Service Co.	100 Prince St.
Hazleton	Penn Diesel Service Co.	27th & N. Church Sts.
Mt. Carmel	Gengler's Diesel Service & Sales	2nd & Orange Sts.
Philadelphia	North American Diesel Injection Co.	2523 No. Howard St.
Philadelphia	Sullivan Brothers	1718 Fairmount Ave.
Phillipsburg	Keystone Diesel Inj. Service	Phillipsburg-Clearfield Hgw.
Pittsburgh, 6	Automotive Ignition Co., Inc.	6358-6364 Penn. Ave.
SOUTH CAROLINA		
Charleston	Diesel Fuel Injection Service	208 Savannah Hgw., P. O. Box 512
Columbia	Boney Diesel Works Co., Inc.	Leesburg Road
SOUTH DAKOTA		
Lammon	Josund Auto Electric	15 First Ave.
Rapid City	Hoseth Auto Electric	324 St. Joseph St.
Sioux Falls	Reinhard Brothers Company	225 E. 11th St.
TENNESSEE		
Knoxville, 15	Diesel-Magneto Service Co.	1423 Island Home Ave.
Memphis, 4	Automotive Elec. Service Co.	982 Linden Ave.
Nashville	Precision Parts Corp.	400 N. First St.
TEXAS		
Dallas, 1	Beard & Stone Electric Co., Inc.	3909 Live Oak St.
El Paso	Reynolds Batt. & Mag. Co.	801 Myrtle Ave.
Houston, 1	Beard & Stone Electric Co., Inc.	805 Polk Ave., P. O. Box 1717
Houston	Diesel Pump & Injector Service	6632½ Navigation Blvd.
Houston	Magneto & Diesel Injector Service	6931 Navigation Blvd.
Odessa	Electric Service & Supply	P. O. Box 1417
Pampa	Radcliff Bros. Elec. Co.	519 S. Cuyler St.
San Antonio	S. X. Callahan	425 N. Flores St.
San Antonio	Womack Bros.	123 Carolina St.
UTAH		
Salt Lake City	Diesel Electric Service & Supply Co.	60 East 13th Street
Salt Lake City	Midwest Service & Supply Co.	1333 S. Main St.
VIRGINIA		
Norfolk	Diesel Injection Sales and Service	808 Union St.
Richmond	C. H. Woodward Electric Co., Inc.	709 W. Broad St.
Salem	Diesel Injection Sales & Service	814 E. 8th St.
WASHINGTON		
Seattle	Seattle Injector & Electric Co.	2706 Second Ave.
Spokane	Spokane Diesel & Electric Co.	704 E. Pacific Ave.
Spokane	Sunset Electric Co.	North 703 Division St.
Walla Walla	Walla Walla Motor Supply, Inc.	128 E. Alder St.
Yakima	Diesel & Electric Service Co.	1506 So. First St.
WEST VIRGINIA		
Charleston	Mountain Service	6414 McCorkle Ave.
WISCONSIN		
Milwaukee, 2	Wisconsin Magneto Company	918 N. Broadway
WYOMING		
Casper	Cotter Battery & Electric Company	402 E. 2nd St.
ALASKA		
Anchorage	Automotive Diesel Electric Supply & Overhaul	2424 E. 5th Ave.
Juneau	Van's Diesel Service	102 2nd St.
CANADA		
Calgary	Hutton's, Ltd.	131—11th Ave., W.
Edmonton	Smith Battery & Auto Electric	10125—105th St.
Fredericton	Stairs Bros. Fuel Injection Service Station	493 Northumberland St.
London	Universal Ignition & Battery Ltd.	324 York St.
Montreal	International Electric Co., Ltd.	1037 Bleury St.
Montreal	Northam Equipment, Ltd.	4135 Rouen St.
Quebec	Quebec Gas & Diesel Engines, Ltd.	145-147 rue Prince Edouard
Regina	Electric Motor Service	1734 Broad St.
St. John's (Newfoundland)	A. H. Murray & Co., Ltd.	
Saskatoon	Lambert Electric, Ltd.	114-116 Ave. A, North
Toronto	A. Cross & Co., Ltd.	6 Spadina Ave.
Toronto	Auto Electric Service Co., Ltd.	1009 Bay St.
Vancouver	Fred Holmes Fuel Inj. Sales & Service Ltd.	627 Bidwell St.
Vancouver	Jeffrey & Jeffrey, Ltd.	775 Homer St.
Vancouver	MacFarlane & Co., Ltd.	1955 Columbia St.
Vancouver	Vivian Diesels & Munitions, Ltd.	1660 Station St.
Winnipeg	Brown & Murray, Ltd.	237-241 Fort St.
HAWAII		
Honolulu	Honolulu Iron Works Company	28 No. Queen St.
Honolulu	Todoki Machine & Marine Works	810 Halekauwila St.
PUERTO RICO		
San Juan	General Farm Equipment Co.	742 Las Palmas Ave., Stop 12, Miramar

(List of foreign service stations available on request)

... for more details circle 165, page 16

ROADS AND STREETS, July, 1955

41

Picture of a Good Road's Backbone



with **LACLEDE** Distributed Steel Reinforcement

*For smoother-riding, safer concrete pavements with
long life, safety and low maintenance costs, eng-
ineers specify*



Laclede Welded Spacers
Assure Dowel Alignment

LACLEDE HIGHWAY STEELS

- WELDED WIRE FABRIC (in sheets)
- WELDED DOWEL SPACERS
- MULTI-RIB REINFORCING BARS
- ACCESSORIES
- CENTER JOINT
- RECESS JOINT



Producers of Steel
for Industry and Construction

LACLEDE STEEL COMPANY
ST. LOUIS, MISSOURI

HOW TO PREVENT GLARE on air-entrained concrete roads

Glare on untreated concrete increases driver fatigue and road hazard . . . reduces visibility.

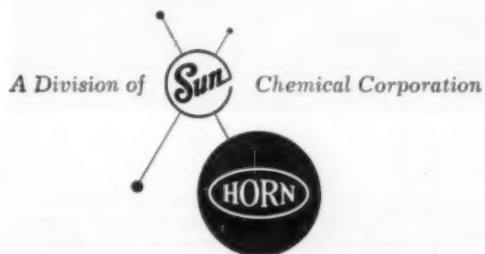


AE Dispersed Black makes concrete roads glare-free . . . improves visibility.

Unlike most "blacks" available, Horn AE Dispersed Black will not absorb or neutralize the air-entrainment in a concrete mix. It does not affect the resistance of the concrete to scaling. Horn AE Dispersed Black eliminates glare and, by heat absorption, assists more rapid de-icing. Horn AE Dispersed Black improves highway safety and appearance, winter and summer.



Wide range of shades, from light to dark, obtainable by mixing at job.



A. C. Horn Co., Inc.

Manufacturers of materials for building maintenance and construction since 1897.

DIVISIONS OF SUN CHEMICAL CORPORATION

HORN • HUDSON • WILLEY (paints, maintenance and construction materials, industrial coatings) • **WARWICK** (textile and industrial chemicals) • **WARWICK WAX** (refiners of specialty waxes) • **RUTHERFORD** (lithographic equipment) • **SUN SUPPLY** (lithographic supplies) • **GENERAL PRINTING INK** (Sigmund Ullman • Fuchs & Lang • Eagle • American • Kelly • Chemical Color & Supply Inks) • **MORRILL** (news inks) • **ELECTRO-TECHNICAL PRODUCTS** (coatings and plastics) • **PIGMENTS DIVISION** (pigments for paints, plastics, printing inks of all kinds)

. . . for more details circle 206, page 16

ROADS AND STREETS, July, 1955

FREE INFORMATION!

A. C. Horn Co., Inc., Dept. H3-78
Long Island City 1, N. Y.

Please send me "Highway Safety with AE DISPERSED BLACK."

Name Title

Firm Name

Address

City State



With Homelite Carryable Generators

No matter where you are . . . with a Homelite Carryable Generator, time-saving, *money-saving* power is always by your side. Yes, take a Homelite out on the job and you have instant, dependable power to operate standard universal power tools and floodlights *plus* (if you have a Homelite Dual Purpose Generator) high cycle power tools.

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7007 RIVERDALE AVENUE • PORT CHESTER, N. Y.

Send for the newest bulletin on Homelite Carryable Generators. See the many ways you can save time and money with these lightweight gasoline-engine-driven generators. This bulletin is fully illustrated and gives complete information on power outputs, sizes and weights of all Homelite Generators. Write, without obligation, for your free copy, today.



Power controlled load lowering is one of the features the operator likes best about this 22-B. It helps him set pipe into position quickly and accurately. The job is part of a 10-year flood control project in Los Angeles county.

Boom folding mechanism (optional equipment at extra cost) permits crane booms 60 feet and longer to be folded with jib suspended underneath for moves between jobs.

TIGHT SQUEEZE

But Bucyrus-Erie 22-B Transit Crane Makes It Look Easy

This job, located along a narrow, tree-lined residential street in Pasadena, California, required the use of a compact clamshell-crane. A storm sewer trench had to be dug through tough decomposed granite and clay. Then, concrete pipe varying in diameter from 45 to 75 inches had to be installed.

The contractor on the job made the best possible choice: he put a Bucyrus-Erie 22-B Transit Crane to work. Assignments like this are tailor-made for this machine. It's easy to move around with its rubber-tired carrier—can work in tight, narrow quarters. You can use it, as this contractor did, for both excavating and crane work—clamshell, orange peel, and drag-line are all operated on the regular crane boom. Above all, it's dependable—a machine you can count on for steady high production every time it starts a job.

Bucyrus-Erie Transit Cranes are available in two sizes—the 15-ton Model 15-B, the 25-ton Model 22-B. Your nearby Bucyrus-Erie distributor can give you complete information.

106E55



South Milwaukee, Wisconsin



... for more details circle 174, page 16

ROADS AND STREETS, July, 1955



**ROAD
LIFE
UP**

**Why More
Freeway Engineers
Are Specifying
SOIL-CEMENT BASE
STABILIZATION**

The cost of constructing and maintaining today's modern freeways must and can be kept down! They must be designed to take a heavy beating from traffic!

That's why more and more engineers are specifying soil-cement base stabilization. The result: tougher roads are being built and taxpayers' dollars are going farther.

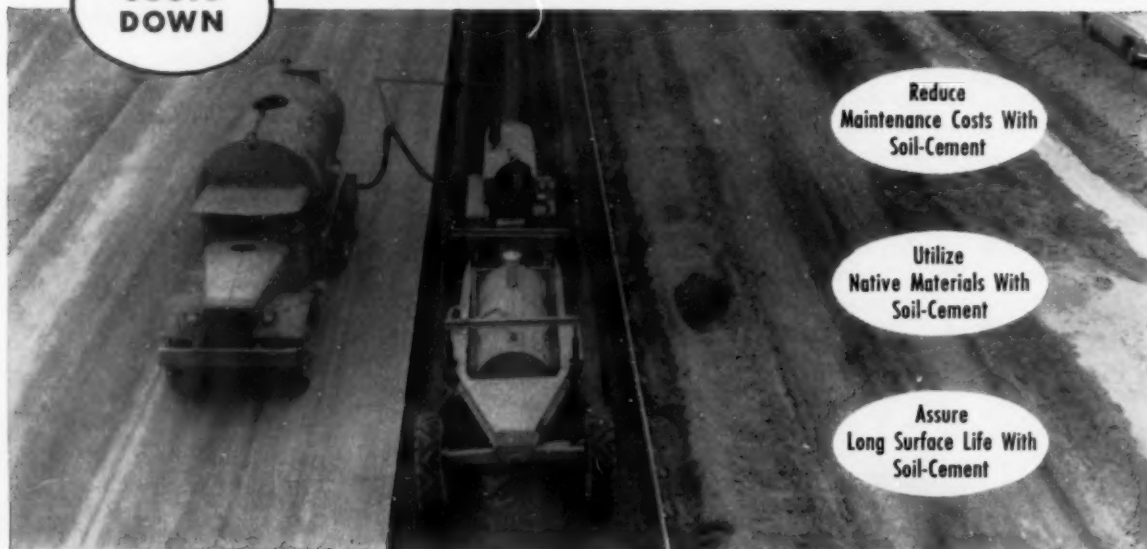
With soil-cement base stabilization, the base course can be made stronger—and often at a lower initial cost, since native minerals can be used.

Engineers are also looking to the future in their specifications. They know that soil-cement base stabilization will reduce normal maintenance and repair costs.

Let us send you case histories that demonstrate the advantages of specifying soil-cement base stabilization.

**COSTS
DOWN**

Most Soil-Cement Is Mixed With Pettibone Wood Mixers



The Model 42 Pettibone Wood, Single-Pass, Self-Propelled Road-mixer, shown here in actual construction work on the freeway pictured above, produces 250 tons per hour of uniformly mixed windrows up to 6 cu. ft. ready for spreading. Tandem drive assures positive traction. Also available is the Single-Pass Model 54, which is tractor drawn and powered, with capacities up to 350 tons per hour.

PETTIBONE WOOD
MFG. CO.

Subsidiary of PETTIBONE MULIKEN CORP., Chicago
6900 Tujunga Avenue, North Hollywood, California
Telephone: STanley 7-3281

For more details circle 233, page 16

ROADS AND STREETS, July, 1955

"Alternate Lane" Paving

FOR TAPPAN ZEE BRIDGE ON N.Y. THRUWAY

Truck-mixer delivery over completed deck also a feature in paving 3-mile-long 6-lane bridge of the New York Thruway over the Hudson River

HOW to place deck paving for the 15,620-ft. bridge over the Hudson from Nyack to Tarrytown, presented an interesting problem to bidders. Mix or transport the concrete on floating rigs? Pave first one of the 3-lane sides, then the other? Or pave sections of either side alternately,

carrying the concrete over the hardened slab?

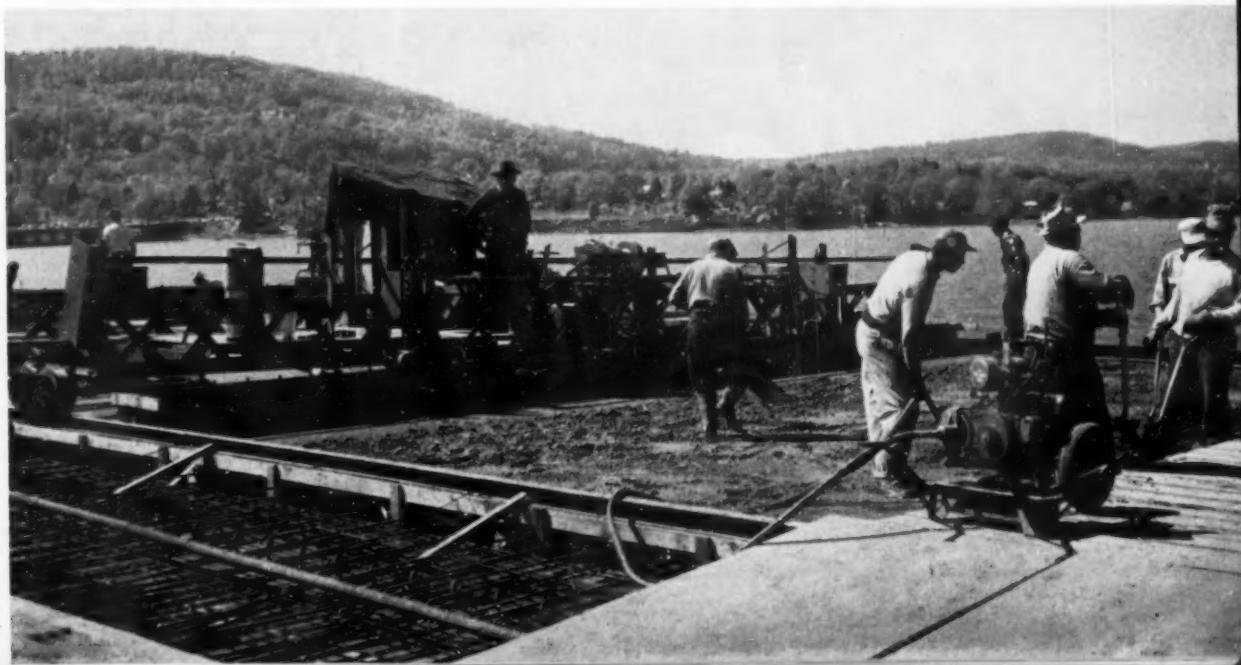
The contractors, Garafano-West Shore-Euclid, are using the latter method. The firm is hauling concrete over the completed deck, under the time schedule dictated by the steel work also in progress for the main channel spans.

Job methods and equipment as observed on the Nyack side in May will be described. But first to summarize some of the design details for the deck of this much-publicized bridge. It is the structure, readers may recall,

which was designed to span the wide but relatively shallow Tappan Zee section of the Hudson 35 miles north of New York. The pier design involves a semi-floating cellular foundation which capitalizes on buoyancy to relieve part of the dead load on foundation piling.

The deck will have 6 traffic lanes, the 13-12-12-ft. roadways being separated by a 10-ft. raised concrete mall

- Heltzel 37-ft. concrete finisher on the Thruway bridge deck. Mall vibrator in foreground.



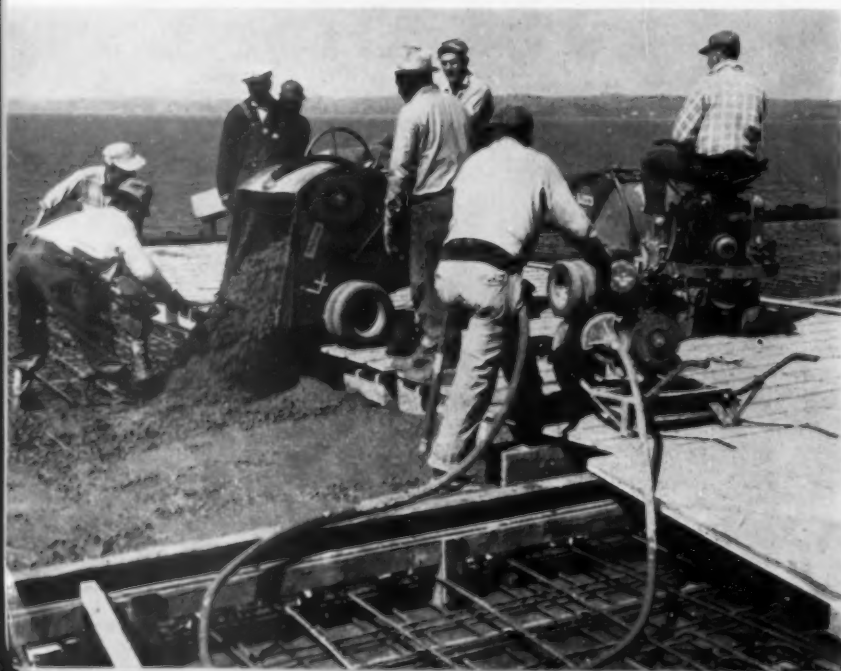


- Mack truck with Rex 8-yd. mixer, backed onto delivery platform.
- Whiteman power buggies receiving ready-mix concrete from platform on deck.



- (Left): Joint finishing in progress on the Thruway deck.

- (Below): Movable platform used for delivery of concrete by cart.



with reflecting type sloping curbs. A 3½-ft. walk on each side brings the total deck width to 91 ft.

Deck slabs with a uniform thickness of 6½ in. are cast in 50-ft. sections for the west approach spans with expansion joints over piers. The concrete is a normal 6-bag mix with Darex air-entrainment additive. The slab is anchored by spiral reinforcement welded to stringer tops, a standard feature on thruway bridges.

Concrete for the job — 32,400 cu. yd. of it—is being supplied under subcontract by Colonial Sand and Stone Company of New York City. This firm set up a batch plant on the west shore and is using six 5½-yd. truck mixers to haul the concrete to the delivery platform on deck, where it is discharged into a hopper.

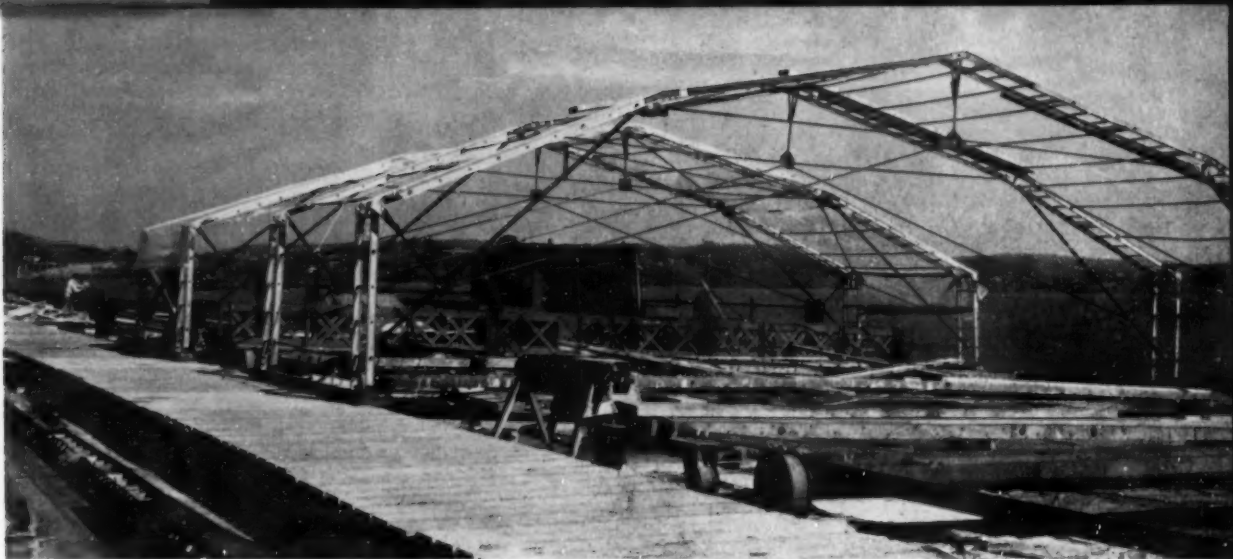
Hardening Time Specified

A limiting factor in job planning is the specification which permits power buggies on the completed slab after five days and mixer trucks after 21 days. The job has accordingly been paced at about 150 to 300 lin. ft. of 3-lane slab (37-ft. wide) per 8-hour day, which at 0.8 cu. yd. per ft. is easily handled by Colonial's plant and trucks. About 1,700 lin. ft. of 3-lane slab was completed on one side late in 1954 before the winter shut-down. Placement was resumed on March 15, this year.

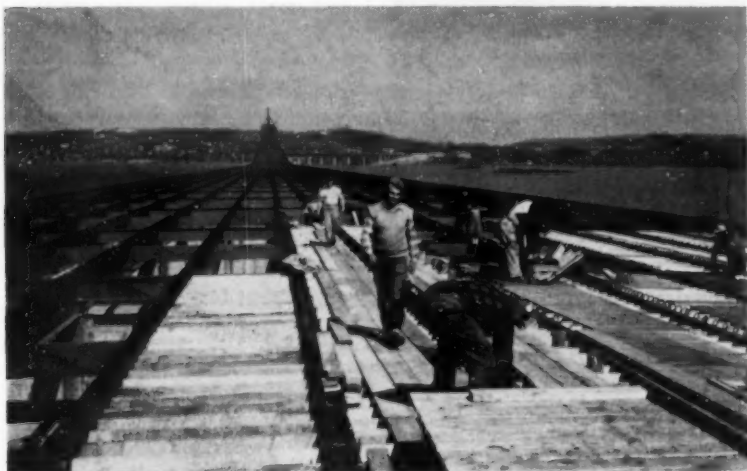
The general scheme of deck construction is as follows:

1. A wood platform is built along the median, section by section, ahead of the work. Precut form members are assembled in place by the carpenter gang.

2. Form lumber is cut on deck, using two strategically located and fre-



● Bents made from sections of aluminum ladders, welded by the contractor's crew, were erected to support plastic covering for protection of fresh concrete against sudden showers.



● Advance carpenter gang laying pre-cut form members. Note high-level part of bridge over shipping channel in far distance.

quently moved power saws, spotted generally at the outward limit of truck delivery of lumber and supplies. Form members and reinforcing steel are carried forward in small jags on either 5-day-old concrete or the median trestle or both, using light power carts. These carts, singly and in tandem or used as dollies, have been pressed into all manner of toting by the ingenious contractors. The limitation on weight in moving materials ahead over fairly green concrete has precluded any extensive preassembly of form panels.

3. Reinforcing steel is brought in by truck.

4. Two concrete finishing machines are employed, one for each of the 37-ft. lanes. Each machine sits idle after several days of concreting, while operations are transferred to the other finisher during the hardening period for the work just completed.

5. The median concreting is done several hundred feet to the rear, using a hand strike-off and special forms for molding the reflector type curb.

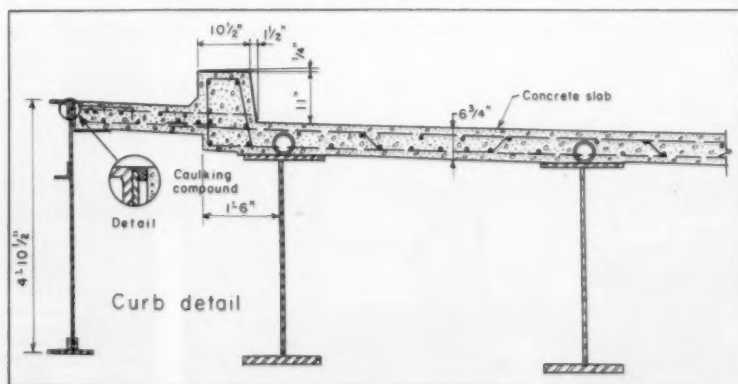
6. Curb and walk forms and reinforcement are then placed and walk sections concreted.

Concrete Placement Methods

The mixer trucks deliver to White-man half-yard power buggies by way of a raised truck platform and hopper, which permits chuting into two buggies simultaneously. Five to eight buggies are used in the average operation, depending on the haul and other circumstances.

Concrete is struck off by a Heltzel machine on temporary rails, followed by a long-handled float and two long-handled lutes. The tooling is completed from a bridge, the surface is given a burlap drag, and wet burlap placed. Curing specifications require seven days of water spray over burlap as a minimum.

Water for mixing and curing was initially pumped from the river, but economic considerations led to the use of water pipelined along the deck from the Nyack municipal supply. A



● Typical cross-section of deck slab including curb and sidewalk slab.



● This concrete lute is a special job, designed for using a second man when necessary, due to extreme (37 ft.) width of deck being finished.

similar arrangement is used on the east shore.

An unusual sight on this job is the use of big aluminum ladder framed tents to protect freshly placed concrete, in event of a sudden rain during working hours.

Three assemblies, each consisting of two or three double-framed arch units, were built on deck by the company's welders. Plastic sheeting is kept in readiness for throwing over the frames, which can be spaced out to provide tent cover for as much as 100 ft. or more of 37 ft. wide paving.

Special Joint Detail

A much discussed feature of this project is a special joint construction method, devised by the con-

tractor and used with the approval of the engineers after construction of a test panel.

Joints are filled with pre-molded rubber and copper sheeting, which is held in place during the concreting by the ingenious method of backing split half-sections of concrete conduit against either side of the joint to hold the assembly in place (see pictures and sketch). The conduit is split in such a manner that the edges will give anchorage. The pre-molded fragment becomes an integral part of the concrete slab adjacent to the joint.

Concrete Deck

The concrete deck across the 2,400 ft. cantilever span system will be built with lightweight concrete, with the median area an open grating. The plan is to place this portion of the deck last.

The bridge is being constructed by



● Details of welded spiral reinforcement and deck forms, ready for placement of reinforcing bars.

● Gar-Bro power carts were used for all kinds of toting of small-unit-weight loads over the week-old concrete.





● (Left) One of several Skilsaws employed to mechanize this job. (Center and Right) A pair of small portable generators (the one on the right a Griffin) seen on the deck operation.

the New York State Thruway Authority, B. D. Tallamy, chairman. Madigan and Hyland, New York Consulting Engineers are the designing and supervising engineers, represented by Harold Knox. G. Mullins is project engineer.

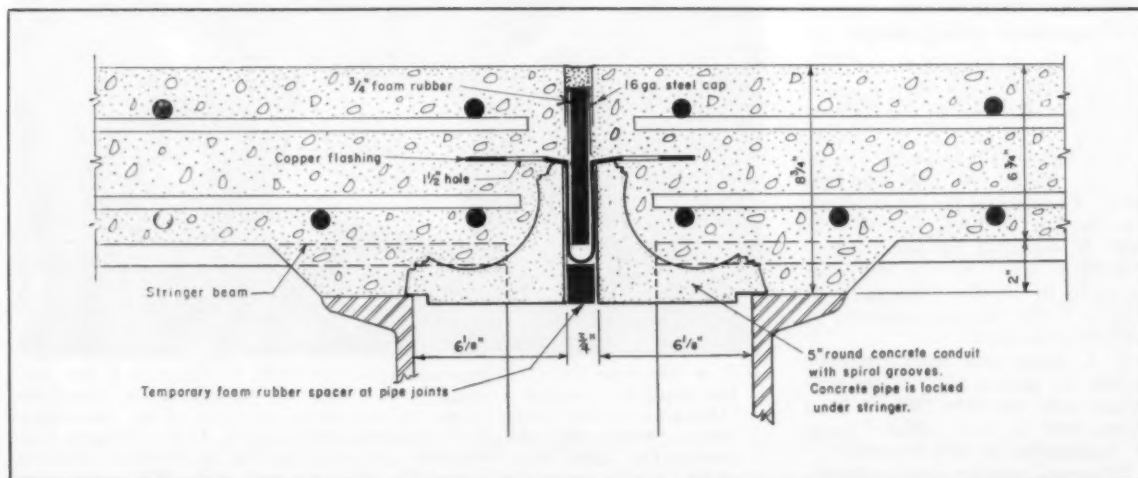
The work is being done under a joint contract with Garafano Construction Co. of Mt. Vernon, West Shore Concrete Co. of Suffern, and Euclid Contracting Corporation of New York City. Charles W. Spero is the superintendent, assisted by F. Fuzzolo, J. Hovelino, and J. Czerkowski.

Small bridge program

● Over 300 old narrow or weak bridges were widened or eliminated during the past year in the Kansas state highway program. The sum of \$750,000 was budgeted for the year, with another \$400,000 for the current 1955 replacement program. The program follows a priority schedule aimed at correcting the worst hazards first in each of the state's highway districts.



● CH&E table saw was set up on deck for pre-cutting form lumber for carrying forward.



● How split sections of precast conduit pipe were used to hold pavement joint during pouring.

Roads and Streets in the News

Another 450 Miles of Pennsylvania Turnpike Routes Authorized

The 360-mile Pennsylvania Turnpike system has received another 450 miles of authorized proposed roadway.

One measure will allow the Turnpike Commission to build a 350-mile "Keystone Shortway" across the northern part of the state, roughly parallel to the existing road, from Stroudsburg on the New Jersey border to Sharon on the Ohio line.

A second proposal would link the present western section of the turnpike around Pittsburgh with the West Virginia border.

Both authorized additions, enabling legislation for which was signed by Gov. George M. Leader, would be built through the sale of revenue bonds retirable from vehicle toll earnings in the same way as the present turnpike was constructed. Governor Leader said he hopes the Stroudsburg-Sharon road will give additional impetus to his plan to build up the north central part of the state as a new industrial area.

Pennsylvania already has some 345 miles of specifically authorized additions to its turnpike system — none of which is under construction. These include a northeast extension from Scranton to Binghamton on the New York State line, a lateral connection of the northeast extension linking the western terminus with the New York Thruway and a Gettysburg extension from Carlisle to the Maryland line.

National magazines giving roads a big play

The national magazines are continuing to find much that is newsworthy and dramatic in the highway situation.

Most spectacular, and some observers feel, one of the most effective, pieces of writing on the subject lately was the one in *LIFE*, the May 28 issue. It described the terrible accident record on U. S. 1 in Maryland, traceable to obsolete design, overcrowded traffic, and encroachment by roadside businesses.

U. S. NEWS AND WORLD REPORT of May 27 gave a more businesslike review under the title, "Where Road Billions Will Go — Ike's Plans Changed, Superhighways Still Favored."

The serious-minded student of highway economics can find much meat in

FORTUNE's article in May, entitled, "Those Expressive Highways." This article focused on the basic problem of financing. It also carried a highly educational picture strip showing the major roadbuilding machines and their functions.

Then there was an editorial during the month of June in *COLLIER*s which presented a convincing case for adopting the full \$100 billion highway proposal.

Bonds sold to start Florida turnpike leg

The much discussed Florida Turnpike, to be known as the Sunshine State Parkway, got a financial start in June with the sale of \$74 million of revenue bonds. The bonds bear 3½% interest. Their flotation was through a banking syndicate managed by First Boston Corporation.

The part of the road financed consists of 104 miles from Ft. Pierce South to the edge of Miami. The

Florida Turnpike Authority is authorized to continue the road 277 miles on North from Ft. Pierce to a point above Jacksonville at an estimated cost of \$207 million.

Construction of the first leg, nicknamed the Bobtail Turnpike, was scheduled to start early in July at a point 10 miles North of Miami. Contracts were to be let in June. Completion of this section is aimed at January, 1957.

Engineering reports are scheduled for completion in March or April of 1956.

This turnpike has been the subject of intensive controversy between Florida citizens and also between various business groups. Its location will be parallel to U. S. 1, the coastal highway, and the route will traverse the State a few miles back of this highway, with interchanges at numerous points. U. S. 1, which is one of the busiest and most accident-ridden highways in the South, is lined with motels, gas stations, restaurants and other roadside facilities, the owners of which have an adjustment problem if the turnpike is successful in diverting much of the tourist traffic.

Construction Safety Leader Gets Citation



● H. B. Alexander (right) of the construction firm of H. B. Alexander & Son, Inc., Harrisburg, Pa., pictured receiving a citation from the National Safety Council for "Meritorious Service" in the promotion of accident prevention in the construction industry. Making the presentation is George O'Rourke, Sr., of the O'Rourke Construction Co., Dallas, Texas. O'Rourke is general chairman of the executive committee of the Council's construction section. The award was made at the AGC annual meeting in New Orleans.

Billions for Obsolete Roads? Are You Designing Far Enough Ahead?

MANY states today are still building inter-city and even interstate highways as land service roads — without the protection to the traffic safety and to land values that can be assured only by proper access control.

More than one city today is building multi-million dollar expressways which are inadequate and even geometrically obsolete the day they are opened to traffic. There is something inherently wrong in an expressway that is full to capacity within weeks after completion.

The human problem that engineers have of orienting their thinking to keep far enough ahead, was emphasized at the recent Texas Highway Short Course. Speaking on the planning for controlled access highways of the future, F. M. Davis and A. H. Christian of the Texas Highway Department characterized access control as the most important single element of planning with which highway engineers are faced today. In Texas, a network of inter-city highways is being laid out with an eye to traffic volumes and needs 20 years hence, as the only sound means of insuring the very heavy investment and adequately serving the public.

- Much of the trouble which highway administrators have had in selling the public on access control, and in selling the legislature on stiffening up to their responsibility here, lies in the prevailing negative attitude toward access control.

The all-too-common definition is: "A controlled access highway is one especially designed for through traffic to which motorists and abutting property owners have only a restricted right of access." Or, "A highway or street especially designed for through

traffic, to which abutting land owners or occupants or other persons have no right or easement or only a restricted right or easement of access because their property happens to abut on the highway or for any other reason."

In Maryland an even more unfortunate phrase is bandied about, to the great detriment of good public relations. The engineers call it *access denial*.

The positive definition advocated by the Texas speakers is this: "A controlled access highway is one so designed that through traffic is assured uninterrupted flow, and local traffic is permitted full access to adjacent frontage roads which connect to the through lanes at controlled points." What a difference in psychology! This wording pictures the comforting fact that the adjacent property owner will be entitled to use the road exactly in the same manner as the general public. This example of applied psychology is indeed an important one, as the na-

tion's highway engineers plan for the rising traffic volumes and spreading interstate highway transportation of the decades ahead.

Speakers Davis and Christian went on to outline the proven advantages of controlled access construction, now familiar to many highway engineers but little brought home yet to the people in the communities involved.

- It would seem to be a foremost responsibility of every highway department to infiltrate its organization thinking with the importance of proper access and roadside control on arterial highway design. Everyone must work toward the modernization of state and local laws which affect this matter, and for better legal tools for the speedy, yet fair acquisition of land.

One immediate job is to initiate an intensive and continuing research and fact-gathering program on the values that accrue where controlled access facilities are built (such as industrial growth, rise in property values, accident reduction, etc.).

To state the highway responsibility in a nutshell, it is to lay out and design protected arterials for the traffic that will develop over the physical life of the road or, in reverse, to build roads that cannot turn into new jungles of roadside establishments.

Some states, such as Oregon and California and a small handful of others, are in the lead. In other states, the highway departments (and the legislatures) must catch up with their thinking and quickly, so that they can give their citizens modern, safe, inter-city highways comparable in more populous areas to our new toll roads. This country today can afford to spend the new roadbuilding billions on nothing less.

ON THE subject of access control, a blueprint of thinking for the future is contained in *American Highways*, April, 1955, issue. We refer to the editorial, "The Highway Crossroads—the Challenge—the Responsibility," and the paper "Control of Highway Access and Roadside," by A. C. Clark, Deputy Commissioner of Public Roads, presented originally at North Atlantic highway meeting, March 3, 1955. For copies of these statements, write American Association of State Highway Officials, 917 National Press Building, Washington 4, D.C.

Grading Begins For Massachusetts Pike

Fast pace planned for 123-mile \$239 million toll road which will join the Northeast's expanding network of inter-connected toll roads, parkways, bridges and tunnels

WHERE is S. J. Groves and Sons Company working this year? B. Perini and Sons, Inc.? Nello L. Teer Company, and other migrant turnpike builders? A string of them have outfits scattered along the Massachusetts Turnpike route, where they have taken "whole package" contracts for this 123-mile toll facility. The last of the contracts for the roadway and the 185 bridges was scheduled for letting early in June, terminating a contract award program which began in November, 1954.

This turnpike begins at the outskirts of Boston and heads in a Southwesterly direction, skirting Springfield and ending up at the New York State line, where it will connect with a spur of the New York Thruway. The road is planned to be opened for its entire length at the end of 1956.

1952 Legislation

This turnpike resulted from creation of the Massachusetts Turnpike Authority by legislative act in May of 1952. William F. Callahan, who was state commissioner of public works was named chairman. Its feasibility was determined by a traffic and revenue study and report made by DeLeuw Cather and Company of Chi-

cago, followed later by Coverdale and Colpitts, of New York, who made an independent survey. Howard, Needles, Tammen and Bergendoff were named general consultants. This firm reported the financial soundness of the project which it is estimated will carry 15,970,000 vehicles during the year of 1957 with traffic increasing to 29,370,000 during the year 1984. Bonds totaling \$239,000,000 were sold bearing 3.3% interest.

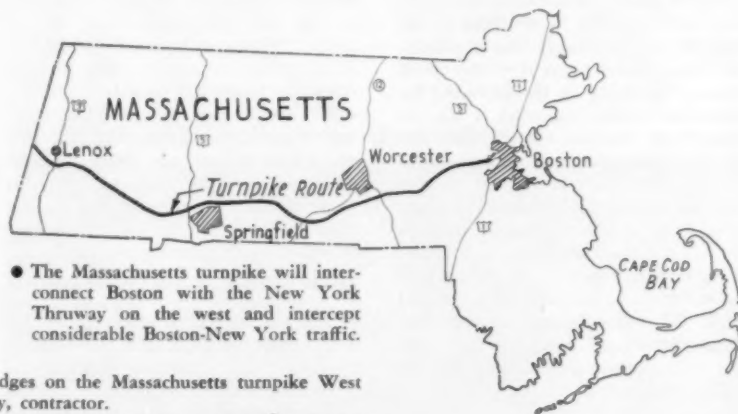
Right-of-way Meeting

The present location represents more than 600 conferences between turnpike right-of-way agents and other

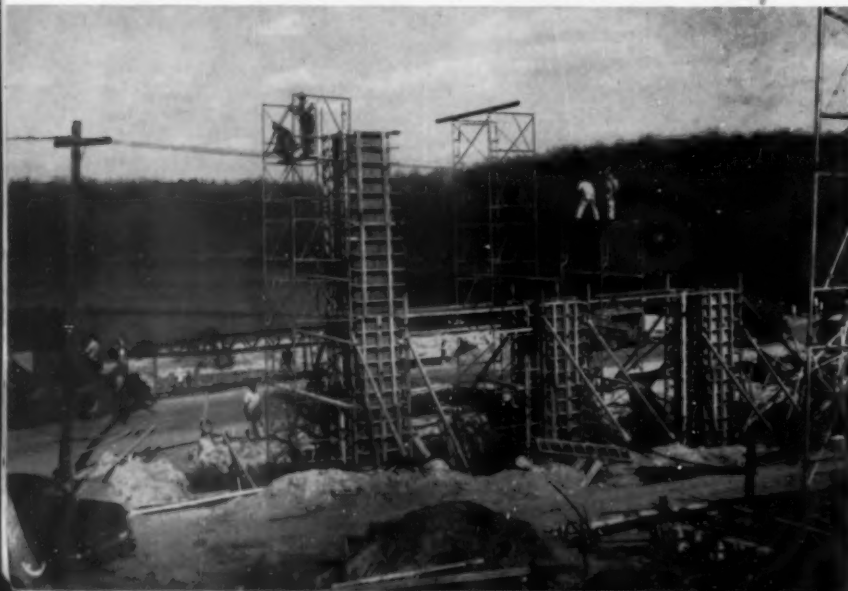
representatives and groups of citizens in the cities and towns along the route. Also an unusual amount of preliminary engineering study of alternate routes, as will be noted in a forthcoming series of reports in **ROADS AND STREETS**.

The 1955 Massachusetts Legislature has given the Authority permission to extend the turnpike into the City of Boston. Preliminary conferences have been held and the traffic and engineering studies are expected to be completed for late Fall announcement.

This turnpike is not too different from others in the construction problems involved, except for the unusually large number of bridges. One bridge will cross a state highway, the Boston and Albany Railroad and the Westfield River in Western Massachusetts at a height of 150 ft. above the valley. There will be much rock excavation and large total quantities of



- Progress on one of the larger of 183 bridges on the Massachusetts turnpike West Street in Auburn. Nello L. Teer Company, contractor.



excavation in some sections, while numerous deep peat bogs also dot the location line.

Right of way cost for the 123 mile road is expected to be less than \$10,000,000 due to the careful skirting of heavily settled areas. About 90% of the land cases are being negotiated.

The turnpike will consist of two 3-lane roads through the heavily populated area near Boston, dropping to 4 lanes divided on West, with provision for future 3-laning of much of the way when traffic justifies. There will be 10-ft. outer and 4-ft. inner shoulders. The pavement will consist of asphaltic concrete with 8 in. of penetrated macadam base carried on a 14-in. frost-free, well-drained subbase.



● Only one man is needed to operate these three batching units. The plant is Butler designed. Operator is stationed on platform of cement batching unit in center.

Push Button Batching

Makes Bow in Detroit Area

PICTURED here is possibly the most interesting concrete paving job of the present season in and around Detroit. It is the joint contract of Denton Construction Co. and Louis Garavaglia, who are handling the concrete paving and the grading and drainage work respectively for a continuation of paving of ramps and express lanes through the interchange of the John C. Lodge and the Edsel Ford Expressways. (See aerial view.)

- When the driver pulls under the spout for stone at his first stop, he merely reaches out and presses a button and the weighed materials drop. He then pushes another button to close the gates and drives on.



CATERPILLAR ANNOUNCES THE

New DW20-DW21 TRACTORS



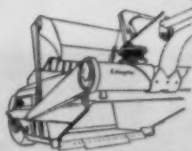
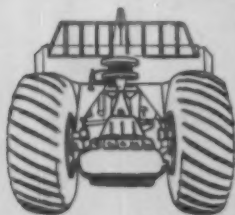
The new two-wheel CAT® DW21 Series C with new No. 470 LOWBOWL Scraper. The new four-wheel DW20 Series E is available with the new No. 456 LOWBOWL Scraper, or the new W20 Wagon. Wagon capacity—20 cu. yd. struck.

"BIG PRODUCTION" FEATURES OF THE NEW DW20-DW21

MORE POWER—300 HP at 1800 r.p.m. Ten per cent more rimpull. New 6-cylinder, $5\frac{1}{8}$ x $6\frac{1}{2}$ inch Caterpillar Engine. Requires only one operating adjustment. Has hydraulic valve lifters—fan belt tension regulated by convenient capscrew-adjustment of generator.

NEW TURBOCHARGER, driven by engine exhaust, utilizes energy which would otherwise be lost. Packs air into engine according to engine load, not speed. Delivers more working HP—greater performance.

NEW, BIG WIDE-SECTION 29.5-29 TIRES, developed after 3 years of Caterpillar and tire manufacturer research, have proved a success in extensive tests on actual earth-moving jobs. Operating at lower pressures and providing big-footprint flotation and wide-lug traction, they're standard on the new DW20-DW21. Optional—24.00-29 tires.



INCREASED HIGH APRON LIFT provides faster ejection of any material.

INCREASED SCRAPER GROUND CLEARANCE enables units to work even under extremely "soft" conditions.

HIGH SPEEDS FOR FAST HAULS:

DW20 (Series E), 2.8 to 32.1 m.p.h.
DW21 (Series C), 2.3 to 20.5 m.p.h.

CHOICE OF STARTING METHODS, optional 24-volt direct electric or gasoline starting engine with 6-volt starting motor.

LARGE AREA PUSHBLOCK gives better pusher contact, faster loading.

AUTOMATIC CABLE SAVER standard equipment.

Plus improved brake control, more easily removed DW20 hitch arrangement, better protected DW21 hydraulic steering system and many other new and thoroughly tested Caterpillar features.

...AND THE NEW

LOWBOWL SCRAPERS

Cat DW20 and DW21 Tractors and their matched scrapers have won world-wide acceptance as the standard of money-making performance among earth-moving haulers.

Now Caterpillar offers you two new pace-setting machines in the DW20 Series E and the DW21 Series C and their matched scrapers with exclusive **LOWBOWL** design.

Everything about these high-speed, high-capacity rigs contributes to **BIGGER** production. The new **LOWBOWL** design of the scrapers

utilizes tractor and pusher power at maximum efficiency. The result: bigger loads and faster loading times. Feature after feature, many of them described briefly here, add up to a new profit-making potential for users. Get the full facts from your Caterpillar Dealer.

Caterpillar Tractor Co., Peoria, Illinois, U.S.A.

CATERPILLAR*

*Both Cat and Caterpillar are registered trademarks—®

**NEW DW20-DW21
—GIANT EARTHMOVERS**

HOW LOWBOWL DESIGN PAYS OFF IN BIGGER, FASTER PAYLOADS



New No. 470 Scraper with **LOWBOWL** design

Both scrapers were loaded with the same material obtained under identical conditions. Result: in the No. 470 a net load weighing 5000 pounds greater than the load in the No. 21—a profitable margin for **LOWBOWL** design!

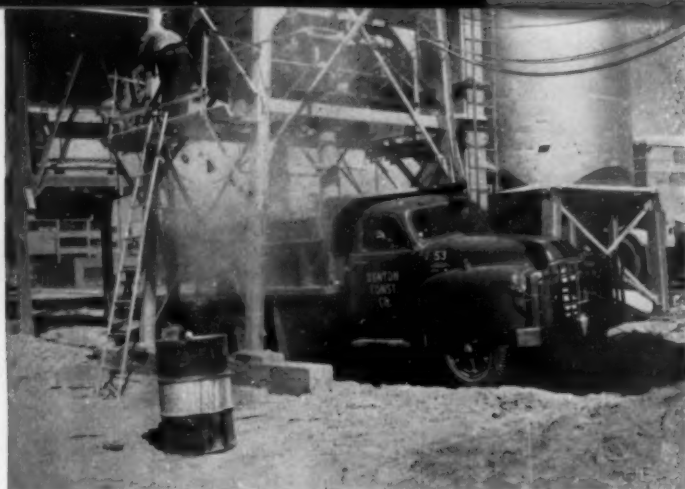
Both No. 470 and No. 456 feature this new concept. The bowl has been widened and lengthened, yet bowl depth has been lowered. Horsepower is utilized more efficiently. Material is loaded with less resistance clear out to the end of the loading cycle. Result: faster loading for **LOWBOWL** design!



Sideboarded No. 21 Scraper

ANOTHER EXAMPLE OF CATERPILLAR LEADERSHIP IN ACTION

... for more details circle 177, page 16



- Additional views showing trucks being loaded at Denton Construction Company's automatic plant, as shown on Detroit Expressway Paving job.



- A single Kohring crane with 2-yd. Owen rehandling bucket alternates between the stone and the sand, requiring from 20 to 50 ft. of shuttle movement.



- Heltzel "Detroit" type concrete finisher in action on the Denton project. Note some of the 14 overpass structures in the interchange system here.



Denton's Pavers Had to Duck Under Bridges

The most notable feature of this work, equipment-wise, is the first use in the Detroit area of a 100% automatic push button controlled concrete batching plant. This plant which is designed by Butler Bin Company, is operated by one man and whisks the batch trucks through the three loading stations in remarkably fast time.

The driver pulls up to the stone dock, reaches out and presses a button located on the post next to the



- Garavaglia's Hough-International loader cleaning up along a ramp pavement. Note trenching done for separate construction of combined curb and gutter to be done under a subcontract. At right is aerial view of the John C. Lodge Expressway leading to downtown Detroit, showing junction with the Edsel Ford Expressway in foreground, where the Denton-Garavaglia work is located.

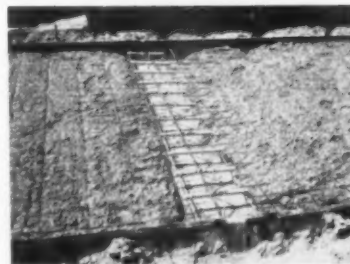
cab and receives two batches of blended large and small stone. He then proceeds to cement station where cement for two 8-sack batches is dropped by the driver or by the operator stationed on the platform. This station has 750 barrels storage capacity, including the silo alongside.

He next proceeds to the sand station where he again presses a button, receives his measured sand, and is on his way toward the job.

- (Left below): Striking off subgrade sand blanket preparatory to paving, using an Austin-Western 99 motor grader with roller attachment riding pavement edge.
- (Right below): Equipment was held to a minimum because of the frequent moves on paving around the interchange. Concrete was struck off by towing a heavy screed log, using an Allis-Chalmers tractor with Baker dozer for towing service. This is the lower lift for placement of distributed reinforcement.



- Denton used a Ransome and a Rex paver for the 12-ft. lanes. Placing concrete under the many bridge decks was a problem because lack of head room prevented raising the skip.



- (Right): Dowels shown in position for joint. Note how concrete bucket skipped joint area, this area to be filled separately to avoid lateral flow of concrete and possible disalignment of the dowels.





● Final finish texture was secured by dragging first one and then another burlap strip forward as shown here.



● Subgrade machine being hoisted by front-end loader while adjustment is made for change in lane widths.

The driver in each instance presses a button again after the load has dropped to close the gates, at which time, the automatic mechanism goes to work and measures out another batch into the hopper.

The 85,000 sq. yd. of 10-in. concrete (9-in. for some ramps) involves some special difficulties on this project. One is the problem of careful advance planning to determine what sequence of paving to adopt for the various ramps and lanes in order to minimize moves by the equipment and avoid getting equipment boxed in.

The other problem is that of paving underneath the various bridge decks. Because the skip cannot be raised while the paver is under the bridge, the paver has had either to be moved out from under the bridge for loading the drum, or else the two pavers have been able to place most of the concrete by dividing up the lower and bottom lifts between the pavers.

Because of the frequent moves, the mechanization of this job is not as complete as is usually seen on rural

highway work. Denton used two pavers (Ransome and Rex) a tractor-towed strike-off screed for the lower concrete lift, a single concrete finisher (Heltzel hydraulic) for striking off



● Hemp rope wedged into newly completed joint to keep out dirt prior to sealing with rubber-asphalt compound.

and finishing the top lift, followed by the usual hand manipulation and hand-drawn burlaps.

The project is under the Michigan State Highway Department metropolitan district, C. H. Brown, metropolitan engineer.

Alkali lignin recommended for waterproofing concrete

One of the many uses to which the paper mill waste products, alkali lignins, have been put in the field of roadbuilding is in rendering concrete waterproof. According to engineers of West Virginia Pulp and Paper Co., Charleston, S.C., asphalt emulsions stabilized with alkali lignin can be effectively added to the concrete in small percentages (1% to 2%). Minimum strength impairment of the concrete results.

The excellent sequestering, dispersing and stabilizing properties of alkali lignin have made it valuable to the paving industry in many ways, these engineers claim.

● The 14-bridge interchange, as seen in March, 1955.



for compacting earthfills
SELECT SOUTHWEST



Southwest **compaction roller**

5 SIZES WITH
 WEIGHT CAPACITY
 FROM 10 TO 100 TONS

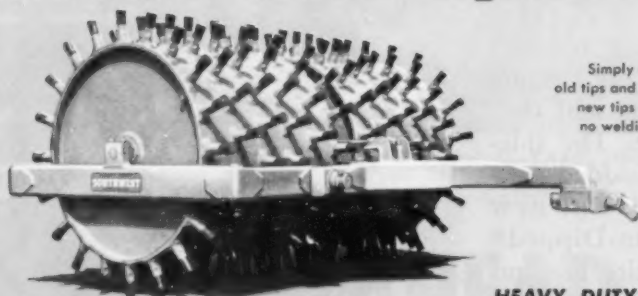


ADAPTER FLANGE permits change
 of draft beam to suit any tractor.

FEATURING:

1. Greater wheel oscillating freedom with each wheel mounted in an independent weight box unit.
2. Heavy duty, reinforced gooseneck and sectionalized hauling yoke.
3. Swivel hitch with Timken roller thrust bearing.
4. Each wheel equipped with two large Timken bearings.
5. Sectionalized hauling yoke permits use of 2 to 6 wheel units.

Southwest **sheepsfoot roller**



Simply drive off the
 old tips and drive on the
 new tips on the job —
 no welding required.



11 SIZES WITH
 WEIGHT CAPACITIES
 FROM 5 TO 20 TONS

WRITE TODAY
 for illustrated folders
 giving complete data
 and specifications.

HEAVY DUTY MODELS FEATURING:

1. Full oscillating double drums.
2. Timken roller thrust bearing at oscillating pins.
3. Two-piece foot with replaceable tips — permits changing size or replacing tip in the field without welding.
4. One-inch steel drum shell.
5. Heavy duty, reinforced box steel frame.
6. Large swivel hitch with Timken roller thrust bearing.

Southwest Welding
 CONSTRUCTION MACHINERY DIVISION

& MANUFACTURING CO.
 ALHAMBRA, CALIFORNIA

SPEED UP THE CUT...



BUILD UP YOUR PROFITS

WITH **Firestone** NYLON TIRES

Firestone Nylon Off-The-Highway truck tires are specifically engineered to deliver more hours of service on the toughest earth moving, rock work or strip mining job.

You speed up your job and operate at lower cost on Firestone Nylon truck tires because the treads give maximum traction and they are extra tough to resist cutting. The side-walls are double thick to give added protection against cuts and snags. The new Firestone Safety-Tensioned Gum-Dipped* nylon cord body insures longer tire life and more retreads. It gives the greatest protection against impact breaks . . . flex breaks . . . heat failures . . . and water damage.

Let your Firestone Dealer or Store show you how Firestone Nylon Off-The-Highway tires will cut your downtime and increase your profits.

ROCK GRIP

GROUND GRIP

ALL TRACTION

G G WIDE BASE

ALL NON SKID



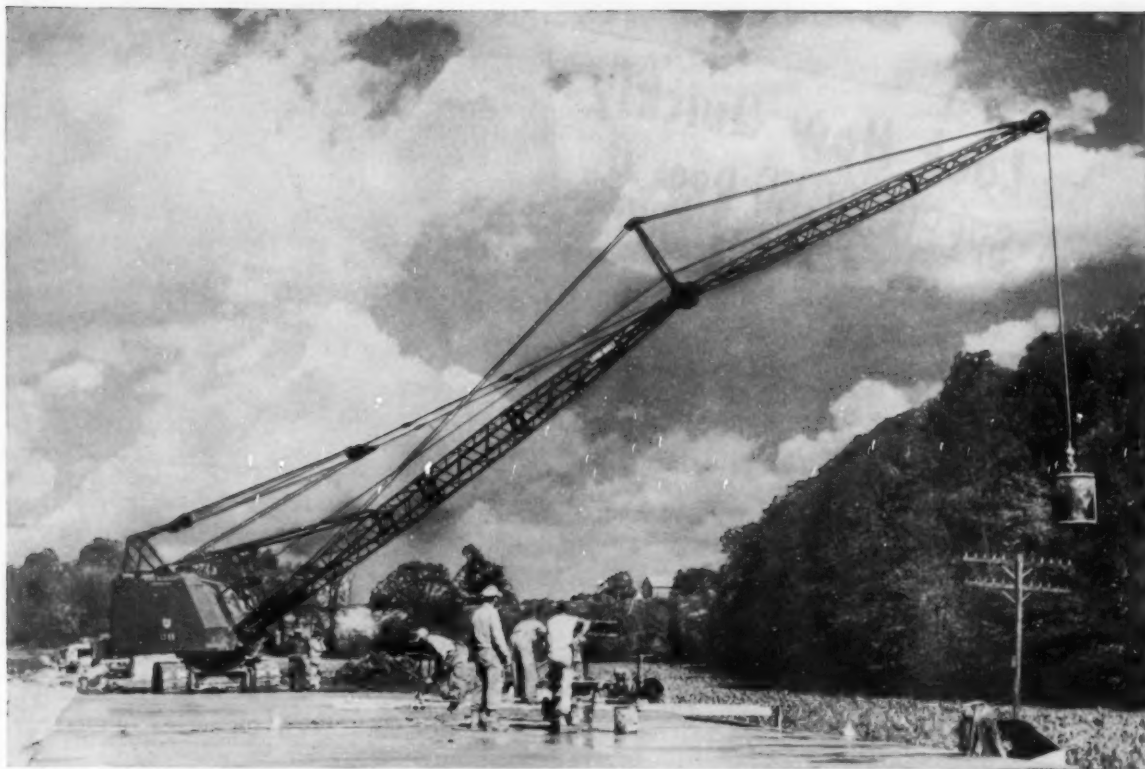
RIB EXCAVATOR

*T.M. Reg. U.S. Pat. Off.

When you buy new equipment or replacement tires, . . . specify **FIRESTONE**

Enjoy the Voice of Firestone on radio or television every Monday evening over ABC

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... for more details circle 188, page 16



FAR REACHING, NEW LS-88 uses jib to spot concrete bucket on road job. Patented high gantry is raised and lowered under power, one of many optional extras.

Long, wide and exceptionally stable crawler mountings and shoe widths are available to suit any heavy-duty, ¾-yard job. All clutches are interchangeable.



UP TO 25% MORE OUTPUT — Speed-o-Matic power hydraulic controls cut fatigue. No lag, jerk or strain.



AHEAD ON ½-YARD JOBS — It's the new LS-58, fastest, most powerful rig in its class, with "big-rig" features.



UP TO 99 NET HP FOR 1-YARD PROFITS — New heavy-duty LS-98. First time Speed-o-Matic in this class.

How to be **AHEAD** on every job

...use a Link-Belt Speeder!
*It's years ahead of
the shovel-crane industry*



... for more details circle 220, page 16

ROADS AND STREETS, July, 1955

TTEAM up with the shovel-crane line that gives you the most productive capacity. It's the only line that offers you true power hydraulic Speed-o-Matic control, *and it's on every model.* Choose from many new models—with pace-setting improvements—in the ½ to 3-yard, 10 to 60-ton range. Equip for extra speed, power and work range—to bid successfully on more jobs—*and earn more on all of them.* See your Link-Belt Speeder distributor for complete facts, or write: Link-Belt Speeder Corporation, Cedar Rapids, Iowa.

LINK-BELT SPEEDER 13,772

Builders of a complete line of crawler and rubber-tired shovel cranes

**Look How Quickly
SPEED SWING Does It
When Space Is Tight!**



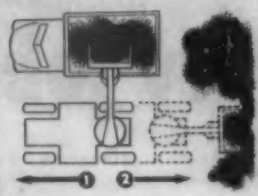
Loading Is FASTER, too! No gee-hawing for position. Simply back away from the pile as the boom swings the bucket over the truck . . . saves minutes every time.

180° Boom Swing Is the BIG Difference!

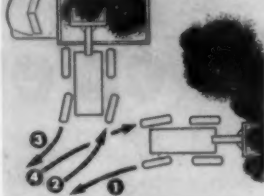
The swing's the thing—especially when space is tight. See what the problem would be without Speed Swing on this street job. Four wheel steer available for really tight spots.



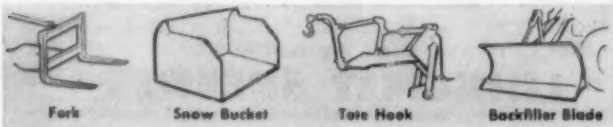
New Way **SPEED SWING**
180° Loader
2 Straight-Line Movements



Old Way **Conventional**
Front End
Loader
4 Gee-Haw
Movements



The Swing's the Thing for Faster Loading! The time-saving, money-saving advantages of Speed Swing are apparent from these diagrams. Bulletin P174 gives full details!



Longest Forward Reach of Any Loader! All important when loading front of trucks over the tail gate. It's a big feature, too, with fork and tote hook attachments.

**Ask for 44 Page Booklet Illustrating
Over 70 Products Made by PETTIBONE**

75 years of Pettibone heavy equipment manufacturing experience back Speed Swing. More than 300 models and sizes of over 70 construction equipment and material handling products made by the Pettibone Companies are shown in Bulletin P200. Ask for it!



PETTIBONE

SPEED SWING

*Another Member of the Labor-Saving
"Speedy" Material Handling Family!*

PETTIBONE MULLIKEN CORP.

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... for more details circle 232, page 16
ROADS AND STREETS, July, 1955

MEMO:

**Here's how to get
the capacity and
flexibility to
handle a wider
variety of contracts**

It's pretty hard to beat a Cedarapids Commander for high daily tonnage and economical performance... especially if your job requires big volumes of finer sizes, or if you're working a pit with a high percentage of fines. The Commander, with its big 30" x 25" roll crusher and large screen, was specifically designed to increase output on such jobs, yet it has proved highly versatile for handling a wide variety of conditions while hanging up production records of 200, 300 and 400 or more tons per hour!

Start with a **CEDARAPIDS COMMANDER**



add a **PORTABLE PRIMARY** with **VIBRATING GRIZZLY** to turn 100% of pit-run material into specification aggregate

With a Cedarapids Portable Primary to handle the heavy crushing load ahead of your Commander, you can turn all the pit-run material... even big boulders... into specification product. You can re-open pits previously considered exhausted, open up new deposits that were considered unworkable because of oversize, or move into quarries close to your job. You'll have the capacity and flexibility to handle a wider range of profitable contracts.

And to step up production still more, be sure your Portable Primary is equipped with a Vibrating Grizzly. Located between the feeder and the crusher, it by-passes fines and undersize material before they reach the crusher. Wet, sticky material is easier to handle, output of the primary crusher is increased up to 25%, and maintenance costs per ton of finished product are reduced. With this set-up ahead of your Commander, you'll have a plant that can't be outproduced in any pit or quarry!

add a **PORTABLE DOUBLE IMPELLER IMPACT BREAKER** for big-volume rock crushing operations



Used as a Portable Primary, the Cedarapids Double Impeller Impact Breaker gives you high capacity production of desirable cubical shaped aggregate or road rock at low cost, under normal or adverse conditions. The extremely high ratio of reduction, reducing rock from 36" x 45" in size down to 1½" minus in one pass, plus the breaking of rock against rock in suspension, assures high tonnages with low maintenance.

Cedarapids
Built by
IOWA

IOWA MANUFACTURING COMPANY

Cedar Rapids, Iowa, U. S. A.

... for more details circle 210, page 16

ROADS AND STREETS, July, 1955

Is the Purchase of Today's New, Bigger Equipment Going to Pay Off?

By Kenneth F. Park, Equipment Consultant

THE small operator with limited means of transportation, with small jobs of varying character — generally working in or adjacent to urban areas — is not the logical one to consider purchasing the new type of big machinery. In spite of the possible perfect adaptability of the machine to his individual task and its ability to do it less expensively, the other conditions surrounding its ownership make it an illogical choice.

For the contractor who — though classified as small — owns and uses several large machines, the inclusion of one or more larger units of similar character can become a logical and profitable consideration.

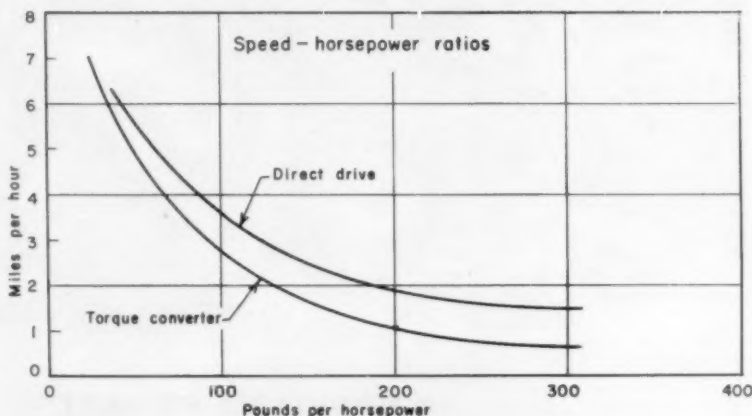
To further determine whom should buy the largest machinery to do a particular chore, it is most evident that large contracting firms utilizing great quantities of machinery and handling big jobs should be logical owners.

If, for discussion, a comparison is made between the largest crawler tractor of yesterday with the great new ones of today, it becomes easily possible to establish the relative value of each. The economic position and importance of any machine can be established to evaluate the profitability and good judgment of its purchase.

To get into the analysis of the relative value of two machines, a typical tractor pair is chosen:

- A. a very recently released big tractor, with direct drive gears,
- B. the present-day conception of the next smaller size.

	A.	B.
Flywheel horsepower	286	191
Operating weight as a tractor-bulldozer and integral ripper, approx.	75,800 lb.	56,700 lb.
Max. drawbar pounds pull at governed speed	54,200 lb.	39,150 lb.
Same, at peak torque	60,860 lb.	45,020 lb.
Relative investment, West Coast, approx.	\$46,100	\$31,900
Cost per fully equipped operating pound	60.8¢	58.3¢
Relative ownership & operating costs, approx., per hr.	\$16.21	\$12.89
Cost per horsepower hour	5.67¢	6.75¢



● Comparison of engine power characteristics for direct drive vs. torque converter drive.

In attempting to judge the relative merits of each as a work tool — or any other machines similar to these — it is first necessary to determine if the weight to horsepower ratio is satisfactory. Too little weight for the horsepower results in the loss of a lot of performance, at least in first gear where a crawler tractor performs its most arduous and effective work. This is occasioned by track slippage since it occurs before the development of full horsepower. Too much heft results in carrying around dead weight in steel and iron that have no function and tend to slow up performances over adverse grades.

Any full operating weight per fly-

wheel horsepower in excess of the figures shown in the accompanying curve will result in unnecessarily slowing down the performance of the tractor over adverse slopes. On the other hand, however, the weight ratios shown *must* pertain if the machine is to do its proposed task with the drawbar pounds pull shown for any gear. The curve also indicates the general difference between torque converter power and direct drive power; the difference occasioned by efficiency losses of torque converters.

Obviously, it becomes necessary to hang certain accessories on a tractor to get any work out of it, thus building up weight, but a good criterion of its snappiness in performance is the application of the above curve figures.

Either of these machines show acceptable ratios, indicating good performances and the expectation of developing all potential work power without the penalties accompanying the carrying of excess weight. Effective drawbar pounds pull will not exceed 90% of the operating weight on

- Largest tractors and scrapers are not for the suburban contractor who jumps around a lot on smaller jobs.
- First cost becomes a secondary matter in weighing the choice of machine size. It is production that counts.
- Larger tractors with more weight and horsepower are demonstrating profit-making ability for dozing, push loading, etc. Elimination of tandem pushers, for example, has obvious advantages.

tracks because that is the average point of track slippage. So any pounds pull rating can be seen to be a correct and useful one, or meaningless if rated above such ratio. In any case there must also be enough horsepower in the machine to create the rating.

Investmentwise, from 50¢ to 60¢ an operating pound for machines equipped as are A and B will give some idea of the going rate of reputable machinery in the tractor field. Since horsepower is the criterion from which performance and cost comparisons can be made — and the cost of owning and operating a requisite for the comparisons — figures representing the cost of owning and operating a horsepower will serve as a means of relating the earning power and value of machinery so compared. For instance, the costs of owning and operating machine A is estimated at 5.7¢ per hour. For machine B, 6.8¢ per hour. The obvious conclusion, then, provided each machine is used properly, is that machine A will prove more economical and a better money earner than machine B. Such being the case, it is the better buy of the two.

Jobs Getting Heavier

The physical characteristics of present-day construction work — pipe lines, highways, dams, mining, logging, even farming — have forced upon the contractor and his equipment increasingly heavier and more difficult tasks. Yesterday's heaviest equipment has laboriously performed these duties but with the increasingly apparent need for more work output and/or cheaper results.

The manufacturers of such products, assuming rightfully the responsibilities for their development, have seen the growing need and have just recently made introductions of greatly improved and more sizeable machinery. The conception of these machines, the long, drawn-out develop-

ment periods, and now the tremendously costly manufacturing processes, have, at this point of their introduction, conceivably run into the expenditure of several hundred millions of dollars.

Several manufacturing companies have completed equipment metamorphoses, now to give the contracting fraternity the finest selection of construction equipment ever offered. The improved benefits of greater performance and lower costs must certainly revert to the good of us, the paying public. For our country; more units of work for less money in dams, highways and other necessary programs.

In checking and analyzing the extra performances of our great new machines, we often find that such a tractor as the 286 horsepower machine, previously mentioned, is capable of more than twice as much work as its smaller counterpart — the 191 horsepower unit. While the bigger machine is but 50% larger, the surprisingly increased performance is accounted for in the fact that, in such instances, the smaller machine is working at the declining point of near failure. The larger machine, on the other hand handles the task with high-performance ease.

Many applications are of such nature that measured performance is near impossible. Others will quickly show calculable improvements, in performance rates and costs.

Among some of the more indeterminate in terms of quantities are:

Rooting or Ripping. The larger machine will penetrate more dense material, break up harder rock, and continue to function well, long after the smaller machine has met the point of refusal. The extra work power of the big machine is clearly distinguishable in such border-line areas where the smaller will no longer perform.

Clearing. This is another area in which a big machine will function in very heavy work and do it easily,

where the smaller in the same spot would be floundering in the repetitive passes necessary to breaking down root or trunk resistance.

Most tractor work is calculable since it involves quantities, or volumes, or work units which can be counted, estimated or figured. Any increase in horsepower and weight — if properly related — can, then, be interpreted in terms of extra performance — and indicate the feasibility or impracticability of the purchase of any machine.

Other tractor functions point to the superiority of great weight and power in one package rather than the multiple use of smaller machines. A good instance is that of single tractor versus tandem tractor push-loading. In a limited number of conditions, it has been found that one big tractor push-loads scrapers better than two smaller tractors of considerably greater combined horsepower used in tandem. This is undoubtedly due to lack of coordination or synchronization between two tractors and the one scraper unit. Further, the rear tractor in tandem loading is working over the chewed-up surface left by the front one, and work power is reduced with lack of traction. In any case, time elements were found to be similar although there might be some question about the relative density of the loads obtained by the separate methods (in favor of the tandem).

More Power Pays Off

As to the loading ability of a single 286 horsepower tractor versus the single 191 horsepower machine, the larger is capable of obtaining about 5 cu. yd. more earth in a properly sized scraper in one minute's loading time. This will be true whether the scraper is powered by a rubber-tired tractor requiring loading help or a crawler type, mostly independent. In a smaller scraper — easily loaded by the 191 horsepower tractor with some 15 cu. yd. — the larger tractor would reduce the loading time by about 40%. The greatest benefit resulting from use of the larger tractor, however, would be in creating about five bank yards more for each trip — to be handled at virtually the same rate of delivery.

On hauls of about a mile one way, the extra 5 cu. yd. per load could easily result in 30 yards more an hour. At normal excavation prices, plus overhaul, added extra revenue to the amount of \$10 to \$20 per hour will result.

These same benefits could result in crawler-scraper combinations push-loaded by the larger tractor. They would not, however, total the same

hourly gain as with pneumatic tired units where speed contributes so much to performance.

In bulldozing, it has been observed that the larger machine has often done twice as much work as the next smaller. These reports, again, probably due to the over-worked condition of the smaller tractor in border-line areas of difficult work. In fact, the big machine often has worked impressively where the next smaller could not handle the task at all.

In any case, where heavy work is to be done, the bigger the tractor the more work is accomplished. In most instances this will also result in reduced costs. And it isn't a happenstance that such is the end result. In

presenting a new and bigger tool that *does* accomplish this end — the manufacturer for months, probably years, has delved into the intricacies of economics, accomplishment, costs, performances, indicated needs, engineering, research, manufacturing, marketing and service. He finally, then, puts together a machine that *does* what was planned at a cost that was *also* anticipated.

The contractor can, generally, purchase such machinery — whatever its new and improved form — with the expectation that it will be better than the old. His worst misfortune in case of a failure would generally be the price of one machine. The manufacturer if found in the same dilemma,

would stand to lose several thousand times that much — so has taken innumerable precautions to protect himself and consequently the ultimate user. Further, if difficulties develop — and they have — the reputable manufacturer stands back of his product and his good name to the extent of complete or at least generous reparation.

The answer, then, to whether our present day, newer, bigger equipment is going to pay off is YES. The only precautions necessary to insure such affirmation are those of normal, good judgment.

I for one will state that I believe our country's contracting fraternity has plenty of that!

ADVANCE BORINGS FOR SOILS DATA

VII — North Dakota Has Own Formula

By A. W. Wise

Materials Engineer, North Dakota State Highway Department, Bismarck

Concluding a series of summaries of state highway department practice in gathering subsurface data for design and estimating purposes.

ROAD excavation in this state is of one type — unclassified excavation. A preliminary soil survey is made by the state prior to the letting. When available, this information is then furnished to all bidders by being included in the project plans.

A typical plan sheet is shown of such soils survey data. It will be noted the information is indicated by a soils profile on the highway centerline and with an occasional cross-section with pertinent notes. On the profile and cross-sections the different soils are identified by hatching and by number. For correlation the soils are shown by North Dakota soils number, B.P.R. number and the AASHTO number. The AASHTO soils number appears in parentheses after the B.P.R. number, such as A2-6(0). The North Dakota soils number is circled. By the described system the soils horizons on the job can be readily identified. An explanation of the North Dakota soils value formula is herewith included.

Soils borings on projects are made by a 5-in. Mobile drill auger-mounted on the rear of a 4-wheel-drive Willys

truck. A 3-man party operates this unit. Holes are not drilled at regular intervals but as often as deemed necessary to determine the soils changes and obtain the required information. While the soils data are determined and compiled as accurately as such preliminary information can be reasonably obtained, it is not guaranteed. It is the bidder's responsibility to sat-

isfy himself of all job conditions before submitting a proposal for the work.

Because of the prairie features predominating in this state, rock is not a major item in excavation work. Therefore, excavation consists largely of earthwork.

Additional necessary notes are included in the project plans regarding sub-cutting, waste, selection of soils, etc. The described soils procedure has been in operation for several years and we believe it has contributed its part towards the low unit prices being received for excavation.

The soil value formula has been (Continued on page 74)

North Dakota Soil Value Formula Explained

Pass. No. 10	Sample-60÷5	If percentage passing is less than 60, reverse order and subtract result from total.
Coarse Sand	40-Sample÷10	If percentage of coarse sand exceeds 40, reverse order and add number in regular manner. Thus sample may be penalized by too much coarse sand.
Fine Sand	50-Sample÷5	Use same method as for coarse sand if percentage exceeds 50.
Silt	Sample-10÷5	If silt is less than 10, reverse as above.
Clay	Sample-10÷5	Same as for silt.
LL.	Sample-15÷5	Same as above.
P.I.	Sample-5÷5	Same as above.
F.M.E.	Sample-10÷10	Less than 10, soil value number is zero.
Centr. Moist	Sample-10÷10	Less than 10, soil value number is zero.
Shrink. Limit	Sample-20÷5	If S.L. is less than 20, reverse order and add number in regular manner.
Vol. Change	Sample÷5	
Spec. Gravity	2.80-Sample÷.05	Specific gravity above 2.80, soil value number is zero.

Note: Express soil numbers in whole figures, never as fractions or decimals. For A3 soils, add 10 to total in lieu of values for F.M.E., Cent. Mois., Shrinkage Limit, Shrinkage Ratio, Volume Change and Specific Gravity.

Euclid TC-12

TWIN CRAWLER

COMPLETELY NEW

**...in design
and performance**



***2* ENGINES...with Separate Torqmatic
Drives...total of 388 horsepower**

Euclid, a pioneer in the development of specialized equipment for moving large tonnages in off-the-highway service, announces the TC-12...

the first really new crawler tractor in years. It's a new concept of

tractor work-ability... smooth performance... unequalled power

... ease of operation and maintenance.

Features that give the

"EUC" TC-12

Here, for the first time, is a completely new tractor that's designed and built to provide all the features you want in a crawler tractor. It is years ahead of the field in ability to get more work done—faster—because it's unequalled for power, smooth operation, speed and maneuverability.

Powered by two 194 h.p. diesels with separate Torqmatic Drives for each track, the TC-12 provides a smooth, steady flow of power to meet job requirements. Unique design permits track oscillation for maximum traction on rough, uneven ground. Three speed ranges—both forward and reverse—give any speed up to 8.3 m.p.h.

ACCESSIBILITY for servicing of all major components is unequalled in any other crawler. Unitized assemblies are all easy to get at . . . they can be disconnected, serviced or removed without tearing down other parts. All lubrication fittings, check points, etc., are located for maximum convenience. Fuel tanks have ample capacity for full shift operation.

EASE OF OPERATION is a feature of the TC-12's modern design. The operator has ample room for maximum comfort and unusually good visibility at all times. Torqmatic Drive and independently powered tracks make the tractor easy to operate . . . there's no clutch or manual shifting of gears.

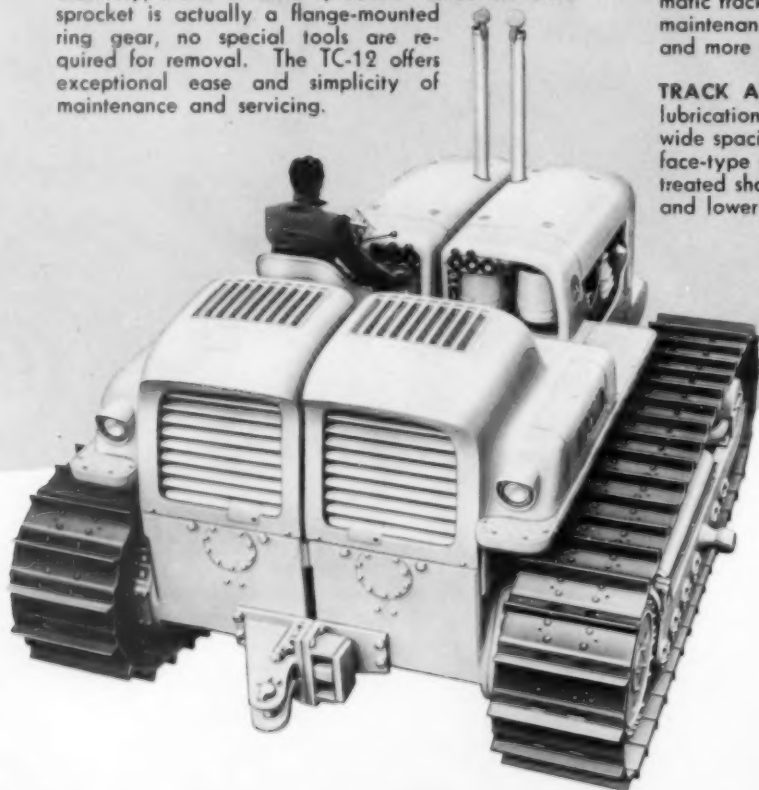
PLANETARY DRIVE is of the same design that has been performance proved in thousands of "Eucs." It can be serviced or replaced without removing the track assembly, frame or drive sprocket. Since the drive sprocket is actually a flange-mounted ring gear, no special tools are required for removal. The TC-12 offers exceptional ease and simplicity of maintenance and servicing.

TRACK OSCILLATION—Twin-Power design, with each half of the tractor separate and connected by only one big transverse shaft, gives the TC-12 maximum stability and traction on rough ground. Each half of the tractor, not just the tracks, can move up or down to maintain better ground contact. Where size or weight restrictions for shipping require, the tractor can be separated into two halves in a very short time.

HYDRAULIC TRACK TENSION—Maintaining proper track tension, a difficult and costly problem with other crawlers, is automatic on the TC-12. Euclid's track tensioning system consists of a hydraulic jack that maintains uniform pressure on the front idler. An accumulator absorbs recoil caused by stones, etc., passing between the drive sprocket and track. Automatic track tension is a feature that pays off in lower maintenance and longer track life . . . less downtime and more work time.

TRACK AND CARRIER ROLLERS have 1000 hour lubrication . . . heavy duty barrel type bearings with wide spacing for maximum support and self adjusting face-type seals to exclude water and dirt . . . heat treated shaft and rollers are integral unit for long life and lower maintenance.

COOLING SYSTEM problems that are common to other tractors are eliminated in the TC-12 due to the rear location of the radiators where there is no obstruction for an ample flow of clean air. More efficient engine operating temperatures can be maintained . . . and with the hinged radiator hoods, replacement of a fan belt is a simple matter, not a major disassembly job.



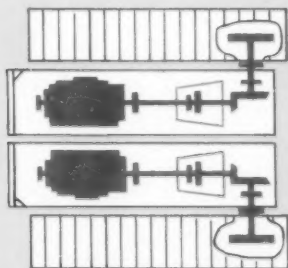
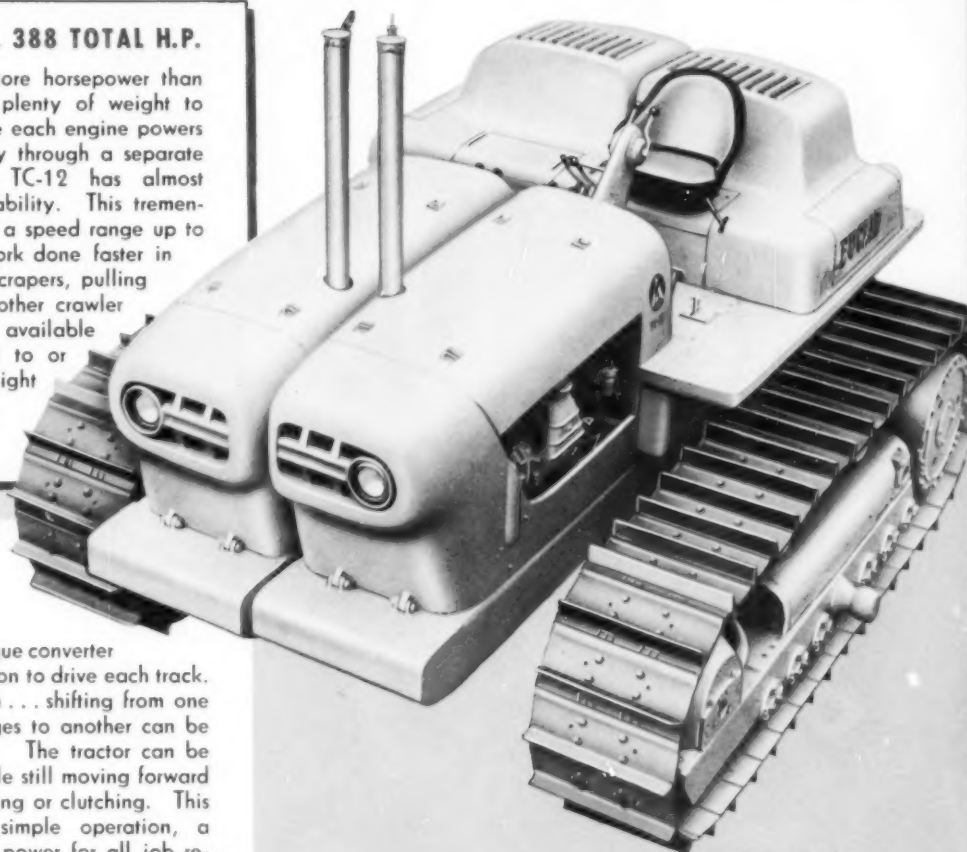
MORE WORK-ABILITY THAN ANY OTHER CRAWLER

TWIN ENGINES . . . 388 TOTAL H.P.

The TC-12 has much more horsepower than any other tractor and plenty of weight to utilize this power. Since each engine powers one track independently through a separate Torqmatic Drive, the TC-12 has almost unbelievable maneuverability. This tremendous usable power and a speed range up to 8.3 m.p.h. gets more work done faster in dozing, push loading scrapers, pulling cable scrapers or any other crawler drawn equipment. The available drawbar pull is equal to or greater than the gross weight of the tractor and attachments.

TORQMATIC DRIVES

Back of each 194 h.p. engine is an Allison torque converter and torqmatic transmission to drive each track. There is no master clutch . . . shifting from one of the three speed ranges to another can be done under full power. The tractor can be shifted into reverse while still moving forward . . . no delay for stopping or clutching. This power train provides simple operation, a smooth steady flow of power for all job requirements, and develops greater drawbar pull at faster ground speed . . . all important for work with rubber-tired motor scrapers.



Twin-Power—using two engines with separate Torqmatic Drives

INDEPENDENT TRACK DRIVES

With a separate power train for each track, the TC-12 has faster and easier steering with greater flexibility than any previous tractor design. Steering is accomplished by putting either one of the transmissions in neutral and using the track steering brake. Tight pivots can be made by reversing one transmission and keeping the other one in forward speed. Operator has "hair trigger" control of steering at all times in any of the three speed ranges, forward or reverse.

SPECIFICATIONS

Total h.p.—388 h.p. at rated speed.
Speeds—3 speed ranges, forward and reverse to 8.3 m.p.h.
Drawbar pull (bare tractor)—forward and reverse 54,000 lbs. low range
53,500 lbs. intermediate
53,000 lbs. high
Track width (standard shoe) . . . 26"

Track gauge . . . 110"
Overall width . . . 11' 4"
Overall length . . . 16' 2"
Height (excluding stacks) . . . 7' 11"
Drawbar height . . . 23"
Ground clearance . . . 20"
Operating weight (bare) . . . approx. 58,000 lbs.

The "EUC" TC-12

...a new concept in
Speed and Power!

With two engines providing a total of 388 h.p. and separate Torqmatic Drives for each crawler track, the TC-12 has no equal for smooth performance, ease of operation and work-ability on any crawler tractor job. It's a completely new tractor with ease of servicing and maintenance that means lower costs and better profits to owners in every field.

Scrapers are loaded in a higher gear with the TC-12 because of Torqmatic Drive that matches any speed.



Higher working speeds ...
no matter how big the load!

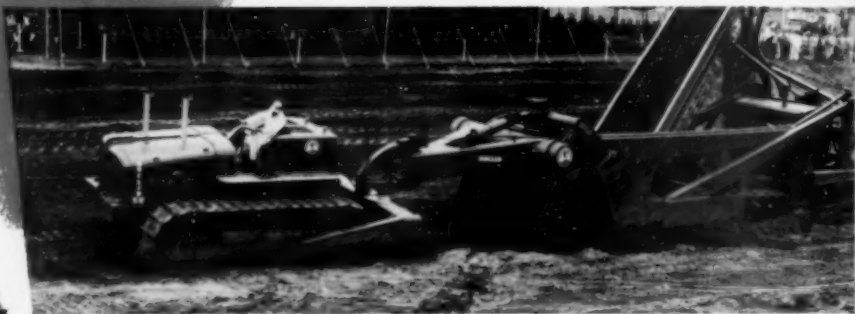
Ease of operation and high
travel speeds save time on
every job.



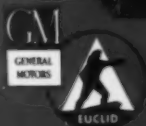
Power and traction for the toughest jobs and top travel
speed of 8.3 m.p.h.



Rear mounted radiators main-
tain efficient engine operating
temperatures.



For pulling big equipment, the smooth flow of tremendous
power maintains steady production.

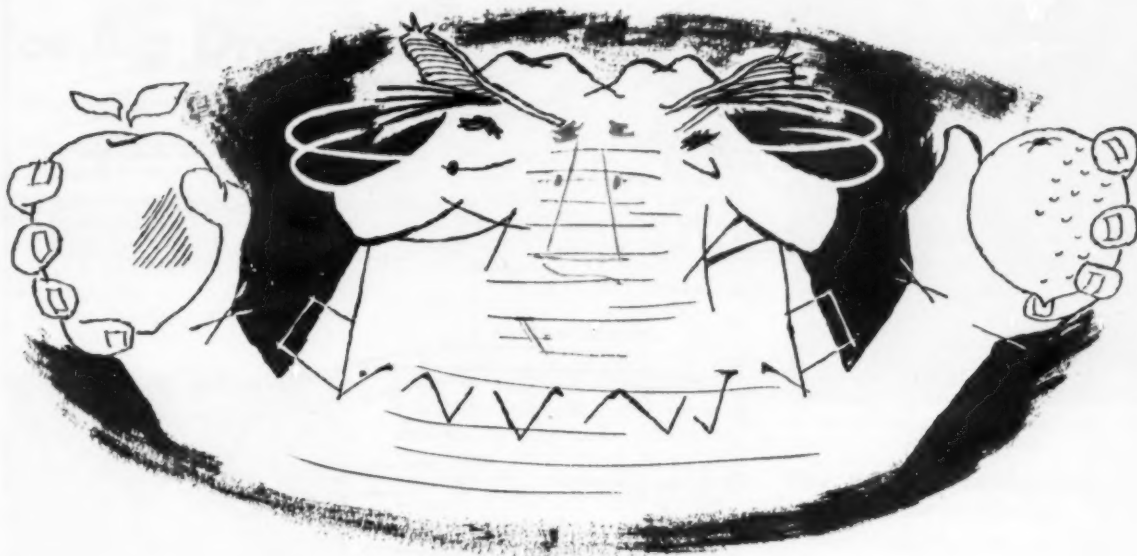


EUCLID DIVISION

GENERAL MOTORS CORPORATION

Cleveland 17, Ohio

YOU CAN'T REPLACE A PEACH WITH A LEMON!



says HY WHEELER, the sage of the socket wrench!

Of course, I don't claim *nobody* else makes good bearings—but you're *never in doubt* when you replace a Hyatt with another Hyatt!

Sure, you may save a little dough on "bargain" offbeat bearings—but take it from an oldtimer, *it don't pay in the long run!* Chances are you'll end up havin' to do the whole job over again before long, and with somebody sore at you, too! I figger it's a lot smarter to play safe and hold out for Hyatts in the blue and yellow box. When it comes to quality,



DISTRIBUTED
BY
DEALERS
EVERYWHERE

**there's no
substitute for ...**

A GENERAL MOTORS PRODUCT



A UNITED MOTORS LINE



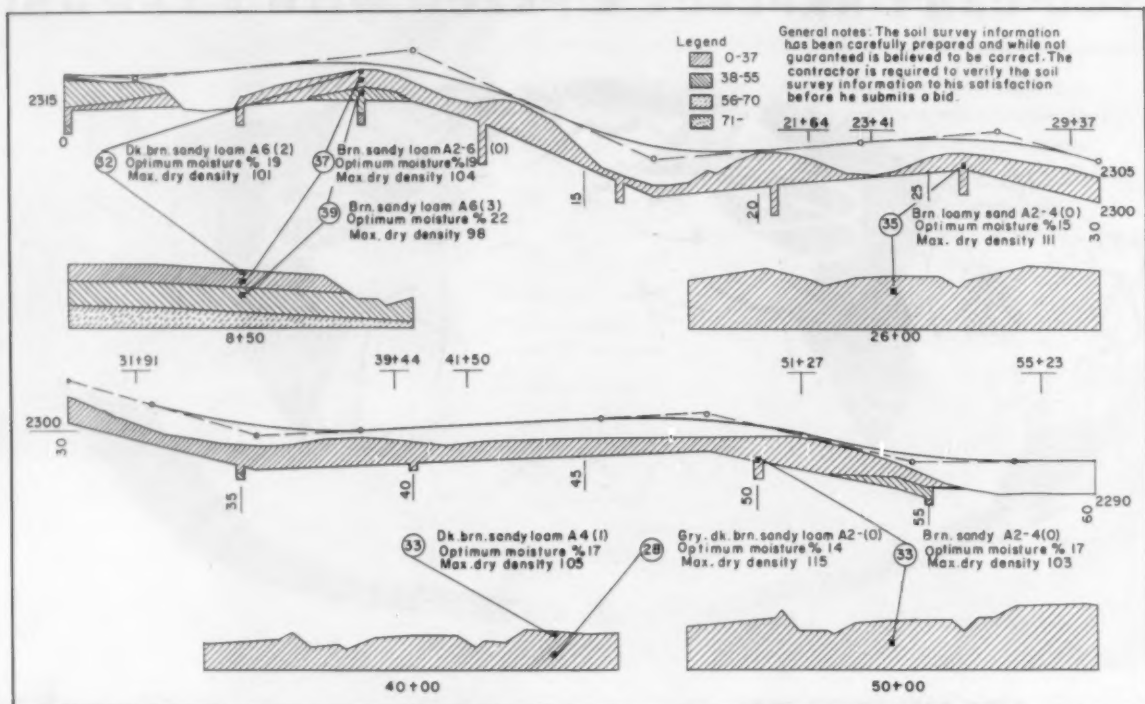
HYATT

ROLLER BEARINGS

STRAIGHT  BARREL  TAPER 

HYATT BEARINGS DIVISION • GENERAL MOTORS CORPORATION • HARRISON, NEW JERSEY
... for more details circle 196, page 16

ROADS AND STREETS, July, 1955



● Typical sheet showing how data from borings are plotted in soils profiles in North Dakota.

Advance Borings

(Continued from page 68)

developed to give a low number to any individual test as it approaches the base figure which is considered good. Thus, a liquid limit of 20 is better than a liquid limit of 60. A base number, 15, was chosen for the L.L. so that practically all samples could be subtracted. The liquid limit of 20 is 5 more than 15, and divided by 5 as given in the formula, equals one. A liquid limit of 60 is 45 more than 15, which divided by 5, equals 9 and indicates the relative qualities of the two samples.

This principal was repeated for all the items shown in the formula and the numbers totaled. A sample which corresponds closely to all the base numbers has a low total number, say 25, and one that varies a great deal will have a total of say 75, and must be very much inferior to the first. A greater value was given some characteristics than others by dividing by a smaller number to emphasize what we consider the more important qualities of a soil.

Soils number 37 and less comprise the best material and include all of the A1, nearly all the A2 and A3 groups, and occasionally an exceptionally good A6. Soils numbered from

38 to 55 include the majority of our soil. Good A6-A4 material is found within this range and occasionally poor A2, and sometimes a one-grain size A3 before treatment. The third group, 56 to 70, contains the biggest portion of the bad soils, A4 of the frost boil type, A5's spongy weak and entirely unfit for base support, some A6 and A7's of the better type. The fourth group, 70+, contains mostly A7 and A8 groups.

The A5 group is entirely unsuited for subgrade use and should be either wasted or buried in the fill. A soil value number exceeding eight for shrinkage ratio signals danger. A soil value number exceeding 7 for silt content means dangerous A4 soils providing water is available for frost action. Such material should be kept out of sloughs and low country with high ground water or where ditches are not available for drainage, such as at underpass sites or city sections. A8 soils (muck) are even more undesirable than A5 soils, and should be eliminated from the fill material entirely and wasted.

New radio system for Jersey department

A plan for a state-wide radio communication system consisting of five transmitters and 40 mobile units is

announced by the New Jersey State Highway Department.

The installation, to aid efficiency in maintenance, equipment transfers and snow and ice removal work, is expected to be in use on a state-wide basis by the end of 1955, according to Commissioner Dwight R. G. Palmer.

Transmitters will be located in department garages and at Trenton and Newark office buildings. Applications will be made to the Federal Communications Commission for power ratings at 60 and 250 watts operating on frequency bands of 47.14 and 47.26 megacycles.

The 40 mobile units initially planned, will be assigned to maintenance supervisors, electrical patrol trucks, bridge maintenance foremen, highway inspectors, and heavy equipment transporting units. Following the initial test period additional mobile units will be added as required.

In listing the advantages to be gained by the use of two-way radio, Commissioner Palmer said it will permit immediate contact with far-flung field forces in cases of emergencies caused by hurricanes, accidents, and snow or ice storms. He believes that the time saved in getting repair crews or other specialists to a given point will materially reduce traffic tie-ups and promote safety.

Nickel Alloy Proves Durable for Big Drop Balls

DEMOLITION BALLS or "skull-crackers" are familiar devices among contractors, as well as around steel producing and fabricating plants and scrap and slag yards. Also in quarrying operations for breaking up over size.

Yet the average concern planning



● Twelve years' life predicted for this ball. Georgia Iron Works.

a drop ball for its special use has not, heretofore, had too much advice as to the construction of this device. To insure durability and toughness in the drop ball, the International Nickel Company, in its publication "Inco Nickel Topics," recommends the use of alloy Ni-Hard for casting these balls. Several examples of such skull-crackers are pictured on these pages.

Long-Life Ball

One is a drop ball furnished by United Engineering and Foundry Company to Vulcan Mold & Iron Company, of Latrobe, Pennsylvania. This ball has operated continuously since October, 1954. By way of comparison, unalloyed cast steel drop balls previously used at this plant, are reported to have lasted only a few months. The latest ball represents about a 10 to 1 improvement. This 6-ton ball has broken an average of 250 tons of cast iron scrap daily, working 5 days a week. The company has

had a similar experience with another ball of like construction, weighing 10 tons, which has been operating since May, 1953, replacing an unalloyed ball which split after three months of service.

Another Locale

A second ball illustrated is that owned by Georgia Iron Works. This is a 3500-lb. ball, made after repeated experiences with balls which split wide open or chipped away. This one has been in operation since the summer of 1952 and "looks like new."

A third ball pictured is one used at Spencer Quarries, in Spencer, South Dakota. It breaks up quartzite, which is extremely hard and tough.

Readers wishing more information on this alloy for drop ball construction — an alloy said to have a compressive strength exceeding 100,000 psi — should write to the editor of "Inco Nickel Topics," H. S. Lewis, editor, 67 Wall Street, New York 5, New York.

● Breaking very hard rock in Spencer Quarries.



● Six-ton ball for Vulcan Mold & Iron Co. — ten times as durable.

Fire fighting equipment planned for parkway

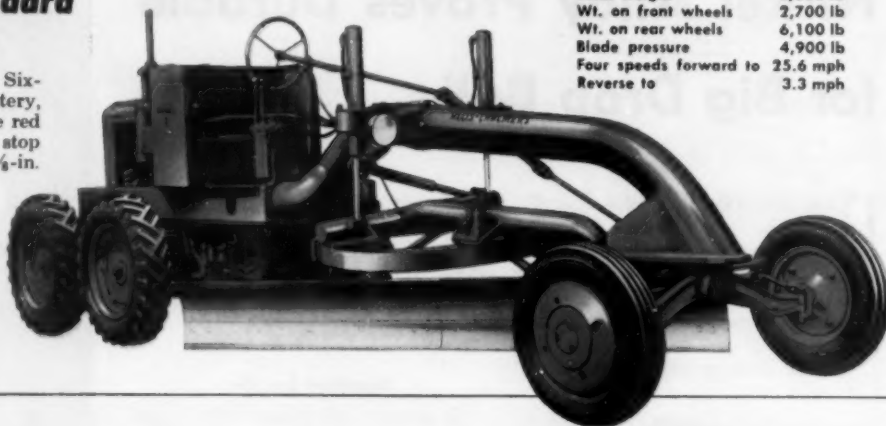
New fire fighting equipment for use in connection with traffic accidents has been purchased, as one of the safeguards being set up by the Garden State Parkway agency, the New Jersey Highway Authority.

The equipment contains a chemical liquid which, manufacturers say, will quench flames five times faster than water from a hose, and will permit almost immediate access to any persons trapped in a burning vehicle.



Model D Standard (GASOLINE ENGINE)

Standard Equipment: Six-volt electric generator, battery, two white headlights, one red combination rear and stop light, muffler, 10-ft by $\frac{5}{8}$ -in. moldboard, hydraulic controls for moldboard lift, four 7.50-20 (6 ply) rear and two 6.50-16 (6 ply) front pneumatic tires with regular tubes.



Total weight	8,800 lb
Wt. on front wheels	2,700 lb
Wt. on rear wheels	6,100 lb
Blade pressure	4,900 lb
Four speeds forward to	25.6 mph
Reverse to	3.3 mph

Match your grading needs with
from the Allis-Chalmers
model D motor grader line

Model D Diesel Standard

Total weight	9,350 lb
Wt. on front wheels	2,760 lb
Wt. on rear wheels	6,590 lb
Blade pressure	4,900 lb
Four speeds forward to	25.2 mph
Reverse to	3.2 mph



Standard Equipment: Twelve-volt electric generator, battery, two white headlights, one red combination rear and stop light, muffler, 10-ft by $\frac{5}{8}$ -in.

moldboard, hydraulic controls for moldboard lift, four 7.50-20 (6 ply) rear and two 6.50-16 (6 ply) front pneumatic tires with regular tubes.

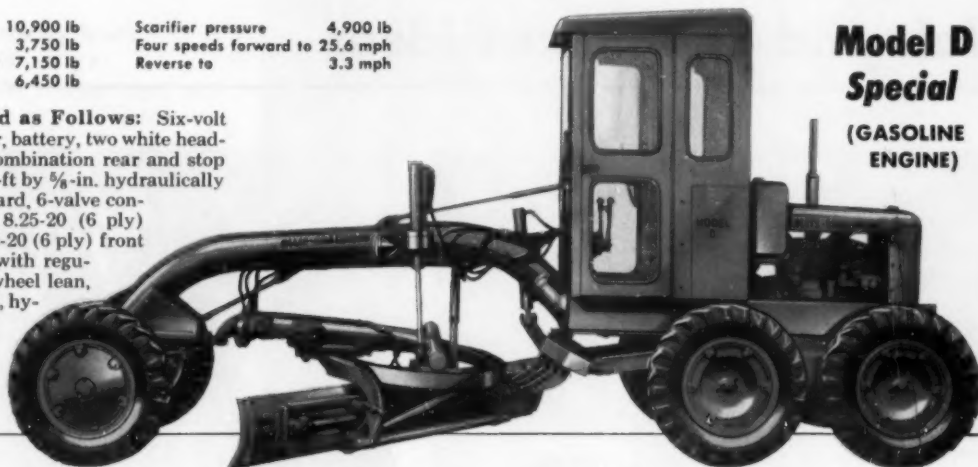
Both gasoline and diesel Model D's are available with any combination of accessories.

You can still buy a Model D for one-third the cost of a large motor grader, and it's the most popular, most versatile small grader on the market. In addition to the units illustrated, the Model D is available with other combinations of accessories . . . or with any of these useful attachments: rear-mounted $\frac{5}{8}$ -cu-yd loader; shoulder maintainer; one-pass windrow eliminator; V or blade-type snowplows. Ask your nearby Allis-Chalmers dealer for a demonstration . . . and prove the Model D's value to yourself.

Total weight 10,900 lb
Wt. on front wheels 3,750 lb
Wt. on rear wheels 7,150 lb
Blade pressure 6,450 lb

Scarifier pressure 4,900 lb
Four speeds forward to 25.6 mph
Reverse to 3.3 mph

Fully Equipped as Follows: Six-volt electric generator, battery, two white head-lights, one red combination rear and stop light, muffler, 10-ft by $\frac{3}{4}$ -in. hydraulically shiftable moldboard, 6-valve control group, four 8.25-20 (6 ply) rear and two 8.25-20 (6 ply) front pneumatic tires with regular tubes, front wheel lean, power circle turn, hydraulic scarifier, all-steel cab.

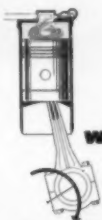


**Model D
Special**
(GASOLINE
ENGINE)

new economy and efficiency

NOW AVAILABLE WITH
YOUR CHOICE OF TWO OUTSTANDING
ALLIS-CHALMERS ENGINES


50-hp
POWER-CRATER
gasoline engine


50-hp
diesel engine
with follow-through
combustion

Total weight 11,450 lb
Wt. on front wheels 3,750 lb
Wt. on rear wheels 7,700 lb
Blade pressure 6,450 lb

Scarifier pressure 4,900 lb
Four speeds forward to 25.2 mph
Reverse to 3.2 mph

Fully Equipped as Follows: Twelve-volt electric generator, battery, two white head-lights, one red combination rear and stop light, muffler, 10-ft by $\frac{3}{4}$ -in. hydraulically shiftable moldboard, 6-valve control group, four 8.25-20 (6 ply) rear and two 8.25-20 (6 ply) front pneumatic tires with regular tubes, front wheel lean, power circle turn, hydraulic scarifier, all-steel cab.



**Model D
Diesel
Special**

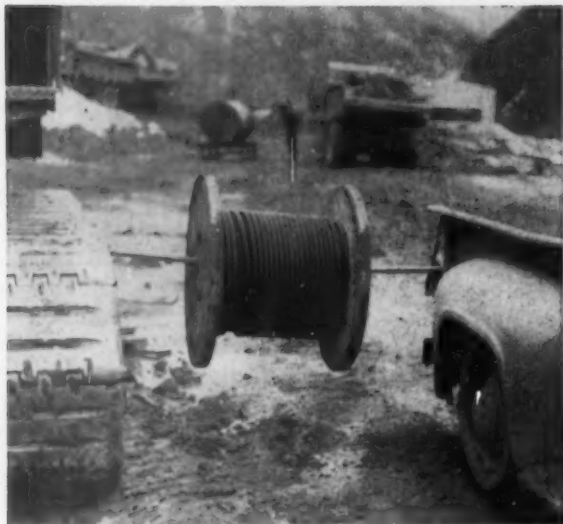
POWER-CRATER is an Allis-Chalmers trademark

ALLIS-CHALMERS
TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

... for more details circle 162, page 16

ROADS AND STREETS, July, 1955

Job and Equipment Ideas



● Suspended cable reel, seen on a very wet wintertime aggregate job in West Virginia.



Keeping cable up out of the soup

When a length of cable must be unreeled for changing the hoist cable on a crane, here is one way to do so and keep the reel up out of the mud. The crew employed by Tyler-Breslin Co., joint contractors on wintertime base rock crushing for the West Virginia Turnpike (Feb., 1954).

The cable was simply suspended between the crane track and the op-

ened tailgate of a pick-up truck, using a steel rod.

Special rig does fast landscaping job

High-speed landscaping methods along the new Ohio Turnpike right-of-way are cutting costs for one contractor. H-M-H Contracting Co., of North Middletown, Kentucky, is seeding and fertilizing divider strips and road berm from a moving truck.

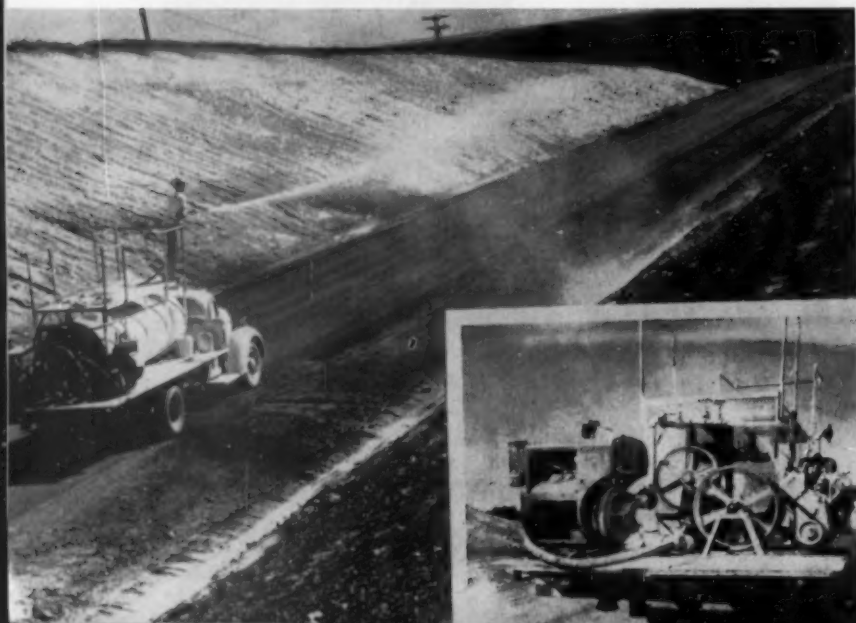
A specially constructed spreading rig, mounted on a flat bed truck, spreads grass seed, fertilizer, lime and water from a 1,000-gal. tank, covering an entire acre of berm in 15 minutes. A Deming portable centrifugal pump delivers the landscaping mixtures through a 3-in. hose. One man directs the spray from a platform on top of the tank as the truck travels the highway.

The contractors obtain more even distribution of seed and fertilizer by using the rig to apply both seed and fertilizer at once. A large belt-drive motor powers an agitator that keeps the mixture uniform inside the tank. The firm applies lime and water with the rig in a separate operation. Each tank load covers one acre of ground when applied efficiently.

In addition to saving time and labor over manual spreading, the spreading rig sows steep fills and cuts that cannot be landscaped by hand. The 30-hp. pump delivers the mix at about 110 lb. pressure, spraying up to 50 feet out from the highway itself. Where no pressure water supply is available, the pump also fills the tank from a well or creek.

Mitchell Powers, of Powers Roofing and Plumbing Company, North Middletown, built the rig for H-M-H. Since completing the landscaping on the newly opened Eastgate section of the Ohio superhighway, the firm has been using two such rigs on other sections of the new turnpike.

● Landscaping contractor spreads seed and fertilizer over road berm along the Ohio Turnpike, from a spreader rig mounted on a truck.



Handling job by truck cranes saves days

In one of the heaviest lifting jobs ever attempted by truck cranes, four bridge girders weighing 125 tons each were loaded and then erected in a matter of hours, saving three to four days' loading time over other methods. This unusual photograph shows four P & H Model 555 truck cranes placing the spans.

Heisler & Woods, Los Angeles, arranged for the four 35-ton cranes to take on the tough assignment. First task was to load the 128-ft. girders — largest of their type ever built on the west coast — onto trucks for moving 30 miles to job site. Two cranes took their places at each end of the girders and actually "walked" the tremendous structures into position for truck loading.

At the erection site, the same cranes raised the girders. Working as a team the four machines placed the four girders in a record short time. Ten feet extra boom length was added to each crane for the lift at the job site.

At this location the machines again had to "walk" their heavy loads, demonstrating the precise coordination possible with modern truck cranes of this type. Handling these tremendous girders has shown this method can make important time savings on bridgework of all kinds.

Better way to suspend a fender tire

During the process of moving some 176 homes off the site of a wartime housing project and shipping them by barge to a nearby city, R. B. Montgomery of Oakland, Calif., found a way to keep tire fenders from being chewed away from the sides of steel barges.



● A new method of hanging a tire on a pier edge.



● A home-made stump plow for smoother tree removing is speeding logging road construction near Georgetown, S.C. Georgetown forester, Larry Howard, in charge of road project, mounted a home-made 24-in. tooth on 8-ft.-long 6 by 6-in. steel framework attached to rear of an International TD-14A crawler tractor to remove stumps without disturbing ground that would result in a soft spot in the road. Stump plow has rip-toothed around a 22-in. pine tree, knocked it over, and pushed it off right-of-way in less than 10 minutes.



● Four truck cranes handling a 128-ft. girder.

Rather than tie them with rope or fasten a chain directly to the rubber casing, his men bent a small strip of strap iron to the curve of the tire, burned a pair of holes through it for a chain and fastened it as shown in the accompanying photo.

Too, the method of fastening the tire to the deck eye by means of a chain shackle made it easy to change the position of the buffer or remove it if necessary.

RALPH MYERS, president and founder of the Ralph Myers Contracting Corporation, Salem, Indiana, died on May 7. His company has built roads and turnpikes in several Midwest and Eastern States.

Memo From: **ROBERT V. RUSCIANO, New York Contractor***
Subject: **FAST DUMPING ATHEY PR21 TRAILERS**

"Athey PR21 is the fastest dumping trailer I've seen. Have used all kinds of high-speed hauling equipment and put Athey PR21's at the top for fast dumping and maneuverability. In fact, we now own six. That hydraulic jack arrangement takes the monkey business out of dumping. No

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Robert V. Rusciano, General Superintendent, Rusciano & Son Corp. and Del Balso Const. Corp., New York Contractors.

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Fast, clean dumping speeds production for Mr. Rusciano on his New England Thruway contract. He operates six Athey PR21 Trailer - Cat DW21 Tractor teams.



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Construction Lessons On the Ohio Turnpike

Every big turnpike construction job emphasizes certain fundamentals of management, and requires judgment in the solution of special problems encountered. This review given at the Ohio Highway Engineering Conference, April 7, 1955, covers a \$350 million project, that is two-thirds completed at this writing

By T. J. Kauer

Chief Engineer, Ohio Turnpike Commission, Columbus

IF YOU anticipate startling revelations in construction techniques peculiar to the Ohio Turnpike, or to toll roads in general, you are going to be disappointed. A turnpike, after all, is simply a high order of limited-access highway. Instead of being primarily a product of newly discovered engineering methods, it is primarily a product of sufficient financing.

Cost of Delays. There is, however, one special requirement in the building of the Ohio Turnpike and other toll roads which is not applicable to so great an extent in the construction of public highways — and this is the vital necessity of meeting a complete *deadline*. The Ohio Turnpike was financed in June, 1952, through the sale of \$326,000,000 of 3½ percent revenue bonds, and interest payments have been required for almost three years since at the rate of about \$29,000 per day. Any delays which would postpone opening would thus prove very costly.

Furthermore, the failure to complete a structure, an earthmoving item or a stretch of paving on time means costly delays to those subcontractors who are unable to move in on the job until other subcontractors have completed their work. The necessity of meeting a deadline or facing heavy losses is the big headache which keeps the turnpike office constantly running low on its aspirin supply. It is this necessity which makes the construction of turnpikes depend on a smoothly functioning organization.

The organization which constructs the Ohio Turnpike consists of the Commission itself; the consulting engineers, J. E. Greiner Company; 16 other consulting engineering firms for the design and construction of the main roadway and structures; 26 prime contractors; and hundreds of subcontractors. Four architectural firms are employed on the 17 toll plazas, 16 service plazas, eight maintenance buildings, eight sewage treatment plants and the administration

building. Some 20 other contractors have the jobs of constructing these buildings and providing the lighting, signs, toll collection equipment and radio-communications system. Not one of these firms can slip up on its job without threatening a delay in the opening date.

Precise Specifications. From the very beginning it was important that design and construction specifications be made precise, detailed and intelligible so that the danger of misdirection

would be held to a minimum. There is the continuing need that problems be promptly solved and that lessons learned in one construction area should be passed along at once to contractors involved in similar work in order to avoid costly errors and delays. To help keep these channels of communication open and to insure uniformity in carrying out specifications the Greiner Company has liaison engineers in the field in each of the 31 design sections. Once a week the liaison engineers meet to resolve the problems which arise among the various contracting engineers, contractors and subcontractors so that there will be no working at cross-purposes anywhere along the line.

Field Engineers. It has also been found essential for the Commission to have competent and thoroughly qualified field engineers assigned on the basis of one to every three or four design sections. It is their job to see

Highlights of Kauer's Experience Review

- Coordination of the many contractor and subcontractor operations is a first essential on a large turnpike project. Liaison and field engineers meet frequently with the management staff.
- Material supply, particularly of cement, has required frequent review to avoid shortages and delays.
- Elastic silt soils, found to be still too elastic when compacted to specification tolerances, were made stable often by a slight further reduction in moisture content during rolling. In other cases, soil was wasted to expedite construction.
- Peat was removed either by total excavation and backfilling, or by partial removal and displacement with heavier materials. Both methods successful.
- Cut slopes which sloughed off during groundwater seepage were repaired by backfilling with wedge-shaped sections of granular materials.
- There can be no short cut in skill and care in joint placement and concrete finishing.
- Centrally mixed concrete, hauled in non-agitating truck bodies, proved entirely satisfactory, as tried on one contract.
- Penetration macadam shoulder construction has required careful control particularly in "backing up" the first aggregate layer prior to compaction, in proper rolling, and in securing a good choke and seal immediately next to the pavement.
- Rail-mounted mechanical finishers proved their value in securing smooth pavement on bridges. Lighter finishing equipment was satisfactory where used with proper skill and care.
- Elaborate drainage designs, for protecting the extensive farm drainage systems traversed, have paid off in conservation and in good will.



● The Ohio Turnpike as with other big turnpike jobs has required coordination of contractor and subcontractor operations, and expediting of work where necessary, to keep contractors on schedule. Shown here is the large (5-yd.) shovel of Western Contracting Corporation in the turnpike's largest rock cut.

that uniformity is maintained in the application of specifications and memoranda, to assist in the solution of problems and to give particular attention to factors which might cause failures in meeting schedules. These engineers meet weekly or as often as occasion demands in my office with the Executive Director, Major General Robert S. Beightler, and myself in order that progress may be examined, problems compared and uniformity assured.

To keep construction moving it is valuable to give the contracting engineers authority to make certain decisions in the field. However, it is essential that the Consulting Engineers and the Commission be informed at once so that, if a mistake has been made, the decision can be reversed before the work has proceeded to a point of no return. Of course, the presence of the Commission's staff engineers in the field helps expedite this process.

Battles of Deadline

Subcontractor Problems. Coordination of the work of numerous subcontractors so that they do not begin tripping over one another is essential in this battle to meet the deadline. For example, a sub-contractor responsible for the installation of guard rail in several contract sections has to wait until paving is complete, and if several paving sections are completed at the same time, he may be hard pressed to meet his schedule in all of these sections because of the need to spread out his available materials, machinery and manpower.

Material Supply. In order to avoid delays, materials must be available in adequate supply and as needed. Take, for example, the acquisition of sufficient quantities of cement. In our case, conferences were first held with

cement producers and commitments obtained in accordance to the various contractors' schedules of operations. Then, as construction progressed, it became necessary to restudy the schedules and to meet again with producers in order to determine their ability to meet the revised schedules. Some contractors were overambitious in their scheduling; others were prepared to proceed with paving ahead of schedule; so that readjustments had to be made. Furthermore, there were difficulties in transporting supplies so as not to interfere with construction operations. To overcome this handicap, the Commission specified in each contract that the contractor should have a full day's supply of cement at the batch plant so that cement suppliers did not have to make daytime deliveries but could haul at night.

By completing the Eastgate Section last December, ten months in advance of the remaining 219 miles of the Ohio Turnpike, we were able to gain valuable experience in making decisions, coordinating decisions and finishing on time — experience which we trust will make it possible to have the turnpike open in its entirety next October 1.

In order to open the Eastgate Section on time, it was necessary for the Commission to pay a premium to secure complete construction of a portion of this section in 12 months' time. Balancing the additional cost against anticipated revenues from tolls, the Commission estimated that it would lose about \$65,000 in operating the Section from December 1, 1954, to October 1, 1955. Now we find that we shall show a \$250,000 profit.

Elastic Soils. Throughout the glaciated areas of northern Ohio, we encountered highly elastic silty soils. These soils had liquid limits in the

order of 28%, plasticity indices of about 10%, maximum dry densities within the range of 110 to 118 lb. per cu. ft., and optimum water contents which were around 14%. It was discovered that when these soils were compacted at moisture contents in the order of the optimum moisture content, they were yielding and elastic, even though the required densities had been achieved. The elasticity of these compacted soils was so pronounced when subjected to the moving wheel load of the contractor's earthmoving equipment that the Commission was faced with the problem of accepting an obviously soft subgrade or replacing these elastic soils with borrow at considerable additional expense.

Economics View

In view of the tight construction schedule each problem area had to be carefully considered from the standpoint of economics. In some cases it was necessary to authorize the contractor to waste these elastic soils and replace them with more suitable material. In some instances this could be done without affecting the cost of the work, whereas in other cases it was necessary to acquire a suitable source of borrow at additional cost to the Commission. As a third alternative, when time permitted, the elastic soils were dried down to a moisture content which was less than optimum. In the latter instance it was decided that the contractor was entitled to additional payment for drying the material from the required placement water content of optimum plus two to a water content of less than optimum. Our experience indicated that these elastic soils became quite stable when placed at a moisture content which was equal to or less than optimum and made satisfactory embankment.

Peat Removal. In the so-called "kettle terrain" of eastern Ohio we encountered many problems in the removal of unsuitable materials consisting of peat, organic clays and other highly compressible soils and mixtures of soils. During the design phase, lack of sufficient time made it impracticable to explore thoroughly each of these sections. We were therefore faced with the necessity of removing these unsuitable materials and replacing them with granular materials which were relatively stable in spite of high water contents to which they would be subjected. To accomplish this, two methods were employed. One method consisted of total excavation and backfilling with granular materials. The other involved partial excavation and displacement with ma-

terials having a higher unit weight and greater stability. Both methods have proved to be very successful. Not all of these situations were limited to eastern Ohio, as the deepest of these peat marshes was encountered in Williams County in northwestern Ohio. Of course, if there had been sufficient time in the design stage, a more thorough surface exploration would have been made and these problems would have been revealed, although it would in no way have reduced the cost of their treatment.

Cut Slope Repairs. In many cut sections along the turnpike minor slope failures have occurred as a result of water seeping from the upper horizons and draining across underlying and unsuitable silts. In most cases corrective action has been taken by the simple expedient of excavating wedge-shaped sections and back-filling with coarse rock of random size in a manner similar to the toe treatment of earth dams. This method has proved economical and completely satisfactory in permitting escape of the ever-prevalent water, without the risk of piping the adjacent fine-grained soils which are sensitive to hydraulic and resultant cavitation.

Earthmoving vs. Paving

Maintaining Pavement Quality. When earthmoving work falls behind schedule, it means, of course, that there is less time for paving operations and that methods must be explored to do the job more quickly than anticipated. Yet, despite the need for speed, we have learned that there can be no relaxation of concern with the typical problems of pavement surface smoothness, proper placing of load transfer devices, and the construction and finishing of transverse joints which will both function properly and provide a satisfactory riding surface. New personnel performing these functions must be effectively trained and their skills developed in the highest techniques in order to produce a satisfactory end product.

Centrally Mixed Concrete. We have learned, too, that a satisfactory concrete paving operation can be conducted directly from a central mixed concrete plant with the mixed concrete transported to the site of the paving operations in non-agitating, specially-designed concrete transport trucks. While this method has previously been used to a lesser extent, we believe that this is the first time that it has been used for a major operation. Many of you may have read articles in the technical magazines* on this

*See ROADS AND STREETS, October, 1954.

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free service. Best of all, LaCrosse's increased trailer volume and advanced modern facilities make it possible to give you the strongest, best-built trailer on the market—at savings up to 38% in first cost. Wide choice of models—from 6 to 75-ton capacity—with flat, drop or tilting platforms. Write for FREE descriptive literature. LaCrosse Trailer Corp., Gould St., LaCrosse, Wis.

LC-32

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Compact truck unit used by Ohio Highway Dept., Div. of Maintenance, containing compressor, pump and drums of Presstite No. 77.

More state highway departments are swinging to **Cold Applied PRESSTITE No. 77** Paving Joint Sealer

In search for a paving joint sealer that would provide longer lasting, more satisfactory service as well as easier application, Ohio conducted experimental tests in 1951 and 1952 using Presstite No. 77 sealing compound.

After thorough study of the highway test sections, the State of Ohio Department of Highways adopted Presstite No. 77 cold applied paving joint sealer for concrete and bituminous paving (Specification No. M-110.26).

Here is an ideal paving joint sealer for new pavements and maintenance re-sealing that remains flexible, resilient and adhesive, withstands repeated expansion and contraction of the pavement, and forms an impervious barrier against passage of water through the joints and into the sub-grade below.

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Easy, rapid application with hose and nozzle.



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. . . for more details circle 234, page 16

type of operations as conducted by one contractor. When he first requested permission for this type of construction, most of us took a skeptical view of the proposal. However, experience has now shown that, with full cooperation from the contractor and normal supervision and inspection by the engineers, an entirely satisfactory product can be obtained.

The concrete in this case was made up of typical concrete pavement proportions and was mixed in a central plant consisting of two separate stationary mixers of 2 cu. yd. each. These mixers operated simultaneously after proportioning of the various ingredients through a typical batching plant. The combined output of the two stationary mixers — that is, a total of 4 cu. yd. of concrete — was hauled in a specially designed truck bed to the site of the paving operations. Hauls were ranged to a maximum of five miles. Hinged plywood covers were used over the top of the truck beds after the concrete was loaded in order to protect it from the dust and to decrease the amount of evaporation that might occur from the wet mix. The covers were, of course, also required to protect the concrete from any rain in transit.

30 Minute Limit

According to our specifications, the time allowed for the emptying of the concrete out of the mixers to the placing in final position on the subgrade was limited to 30 minutes. With constant maintenance of good haul roads there was seldom any difficulty in staying well within this maximum permissible time. The concrete remained in an entirely satisfactory condition during the haul period and arrived on the subgrade in good condition with only a negligible loss in slump of the concrete or in the entrained air. At no time was there any indication of objectionable segregation in the mix during the period of transit. This procedure is considered particularly to have advantages over the use of transit mixers for a paving operation. In our opinion it permits better and more efficient supervision of the mixing operation than can be normally accomplished with a transit mix operation.

Penetration Shoulders. One item of our turnpike construction which has not had an extensive background of use for this specific purpose is the bituminous penetration macadam shoulders located on both sides of each 24-foot concrete pavement lane. This macadam is placed over the typical Ohio I-22 granular subbase which is also used under the concrete pavement. Thus there is the inherent prob-

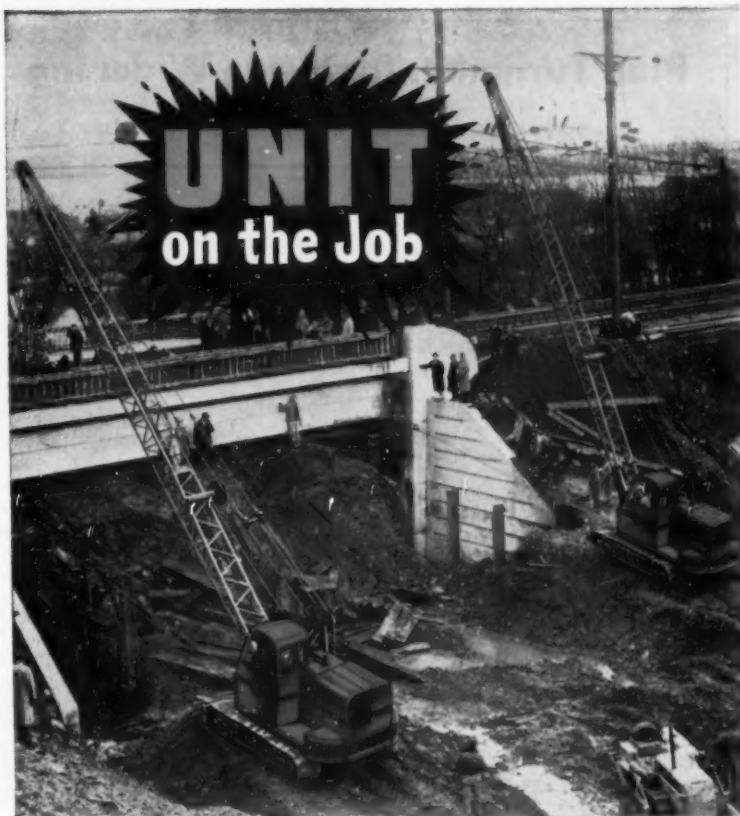
lem of obtaining a free-draining material for subbase purposes and at the same time a material which will develop the stability necessary to withstand the heavy compaction equipment essential to satisfactory penetration macadam construction. This problem is aggravated where the contractor elects to use a natural gravel and sand deposit for this purpose. We feel that good results are being obtained with the gravel subbase where the contractor provides the full quantity of subbase aggregate outside the surfaced shoulder to "back up" the first layer of coarse aggregate for the macadam, prior to placing or compacting that aggregate. Even with this procedure it has been found necessary to maintain careful control over the compaction operations in order to avoid excessive displacement of the subbase material. Vibratory compaction equipment is an aid in this operation but not a substitute for compaction by rolling.

Sensitive Feature

Another sensitive feature noted in this construction item is the area immediately adjacent to the concrete pavement edge. Without careful attention at this point an adequate choke and seal will not be obtained. This is considered of prime importance to avoid the infiltration of excessive moisture from pavement run-off entering the macadam surface and underlying subbase at this point.

Bridge Decks. Construction of concrete bridge decks, including adjacent abutment slabs and approach slabs, has long presented a major challenge to highway builders to obtain a smooth riding surface. We have attempted to minimize this problem by requiring mechanical finishing of the surface of these areas. Where we have adhered strictly to mechanical finishing — that is, a standard bridge deck finishing screed supported on adequate steel rails which have been accurately set — the results have been quite satisfactory. Other similar methods using light equipment such as vibratory screeds or oscillating strike-offs have been tried and on occasion have given satisfactory results. However, it has been found that the lighter equipment demands a greater knowledge and skill on the part of operators and also results in a greater need for subsequent hand work. Thus this latter method is more dependent on the experience and skill of the workmen in order to obtain a satisfactory end product. Abutment slabs are laid on box type, cellular abutments supported by piling to minimize settlement.

Farm Drainage Protection. Another



TEAMWORK and Accurate Control

Working as a team, these two UNIT 1020 Cranes moved a 500 TON railroad bridge from its temporary mounting to the new structure in a period of thirteen (13) minutes. This type of job calls for smooth and accurate control of boom and hoist line operation. UNIT'S extra long crawlers, multiple-hinged shoes, wide axles, and hook rollers provide perfect balance and stability. This, together with the FULL VISION CAB for complete visibility, makes UNIT the machine that is dependable and safe to handle efficiently any type of heavy-duty work.

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All Models Convertible to ALL Attachments!

... for more details circle 248, page 16

Plan Turnpikes for Inside Widening

... says this Veteran Commission Member

By J. Gordon McKay

Member, Ohio Turnpike Commission, Cleveland

Experience gained in steering a gigantic turnpike construction program through legal and public relations pitfalls, is reviewed by this speaker. From a talk before the Sixth Annual Earthmoving Conference held by the Society of Automotive Engineers at Peoria, April 13-15, 1955.

YOU as automotive equipment designers, in your role as creators of better roadbuilding machinery, will be interested in some of the major policy problems of turnpike management. Turnpikes would seem to be the basis for building up a substantial portion of the nation's arterial road system, for the reason that toll revenue bond financing is available while the cost of building free roads for our growing traffic has gotten beyond the states' financing capacity.

I predict that federal financing through federal mortgage revenue bonds, outside the faith and credit of the government, will eventually be voted because there is no other way of expediting the completion of the Interstate System program.

• • •

In Ohio the possible role of the turnpike is shown by some figures. Of the 18,000 miles of state roads (of which 8,000 miles really have no place in the system), Ohio has 900 miles which could be built as pay-

as-you-go turnpikes. These would take 70% of the state's intercity traffic.

On many arterial roads the bankers would say "no" to toll bond financing. These roads would fail under the banking fraternity's mysterious 1% to 1 rule; no insurance or trust company can buy any mortgage revenue bonds unless the gross probable income from the property is estimated at 1% times the cost of plant operation and retirement.

• • •

Feasibility studies for toll roads present a somewhat puzzling picture to date. We, in Ohio, think that rather than hire outside consulting engineers to make such studies, it would be best done by the state highway department. A well organized department, having the benefit of traffic records and planning data, could do a better predicting job than the consultants.

Every turnpike built to date, except the one in West Virginia, has produced revenue so far exceeding advance estimates that the consultants have been made ridiculous. There is inherent danger in utilizing outside experts in this field, as two recent situations in planning turnpikes in Ohio have borne out.

• • •

Right-of-way is a key subject in planning toll turnpikes. The turnpike agency can get into more troubles

and scandals over right-of-way than over any other phase of the planning and construction. In Ohio we had to acquire 6,500 parcels for the 241-mile Project No. 1, and our experience in this connection has underscored some principles. One is, never have the same group do the appraising and the negotiating. This opens the way to too much temptation.

Another lesson is to hold off structure and roadway location and design until sufficient soils data are on hand. Get the soils information first, and it will save large sums by helping avoid construction headaches.

• • •

Great care should be given to the selection of trustee banks in turnpike financing. For the Project No. 1, we sold \$326 million in bonds at 3%. We could have had local trustees alone. As it was, we never permitted a balance of over \$500 in construction funds in any local bank. By taking funds only as needed for construction we earned over \$16% million in the construction fund in interest saved during the period since issuance of bonds.

In the involvement of engineering and construction plans, and in the supervision of construction, the turnpike management should watch every step. In my opinion the suggestions of the consulting engineers should never be accepted without careful review. It takes two heads to do a complicated job.

In the planning, local talent among city planning and engineering people should be sought and utilized. This improves local public relations along the route, and also insures that problems are approached with a fuller understanding of local needs and conditions. You will get a better job.

• • •

Turnpike design is in a period of rapid evolution. Each one built makes a contribution. For example, when the planning was begun for the Ohio Turnpike, effort was made to get us to adopt the narrow (6 ft.) median design of the Pennsylvania Turnpike initiated 17 years ago. Our consultants opposed adoption of a wider design (56 ft. minimum including shoulders), claiming that it would add 15% to the cost. It actually added about 6%, and has contributed greatly to added safety, as subsequent statistical analysis of cross-the-median accidents on other turnpikes has shown.

Our commission, also over the objection of the consultants, insisted on another feature, i.e., that of depressing the median 4 to 4½ ft. Some

(Continued on page 90)

lesson learned, and one that could apply to any major highway being built on a new right-of-way, is the importance of pledging a policy of maintaining farm drainage practices.

In northwestern Ohio, where farmland has been reclaimed from the "Great Black Swamp" which once blanketed the area, there was grave concern that the Turnpike might disrupt the drainage systems. Maximum farm production in that area depends on adequate drainage and future expansion of agriculture depends on extension of drainage systems.

In view of this widespread concern the Commission and its Consulting Engineers consulted with landowners, county engineers, and experts from the Ohio State University and the

United States Soil Conservation Service in formulating its farm drainage policy. Eventually it developed a policy intended to preserve existing drainage systems and to provide for future expansion over the next 25 to 50 years.

October 1 of 1955 is the date set for opening the entire turnpike. The Commission is determined that it will do everything within its power to meet that deadline, which represents, in the manner in which the turnpike is being built, the end of the assembly line. It takes more than engineering to do it. It takes organization and public cooperation as well. These are some of the lessons we have learned to date in constructing the Ohio Turnpike.

On The Ohio Turnpike—Filling Biggest Bog Area

TRICKY peat bogs along the route of the Ohio Turnpike put the ingenuity of more than one contractor to test during the 1954 season. V. N. Holderman & Sons, Inc., of Columbus, Ohio, on their 14 miles of turnpike (Contract Section C59), encountered a peat mass which ran to a depth of about 70 ft. and extended 350 ft. along the grade.

Under the contract, peat deposits to a depth of more than 12 feet must be removed. Smaller peat deposits were disposed of by using Holderman's scrapers, dozers, and drag lines but Ruby Construction Co., of Madisonville, Ky., got the job of removing the big peat deposit — perhaps one of the largest such deposits on the entire turnpike.

Hauling by truck from borrow pits within a radius of 8-9 miles, the Ruby firm hauled 180,000 cu. yd. of sand for backfill of the peat. Peat removal was



● At left is the 180,000 cu. yd. sand fill placed over a bog section of the Ohio turnpike western extremity of the highway. (Photos courtesy of Caterpillar)

accomplished by the displacement method, consisting of dumping sand progressively out into the bog; the sand's greater weight displaced the peat, "heaving" out the undesirable material. As the sand went into the

peat mass, a dragline, operating from the top of the fill, kept the peat loosened to stimulate the heaving action of the heavier material. So successful was the operation that as the fill progressed, some of the peat "boil-



● Piping system used in jetting the sand fill.



● Amount of settlement in the sand fill is here indicated — note the men standing at a point where settlement was the most pronounced. At right is the dark peat, "heaved" out as sand filling progressed.

ed out" laterally at considerable distance from the side of the fill.

Borings were later taken, indicating thorough displacement of the peat down to hard clay. The entire fill was then hydraulically consolidated in accordance with requirements established by the Turnpike Commission. Jetting was accomplished through $\frac{3}{4}$ -in. double strength perforated pipe, cut in 10-ft. lengths and inserted in the fill at regular intervals. Water for jetting was obtained from a well, drilled alongside the fill.

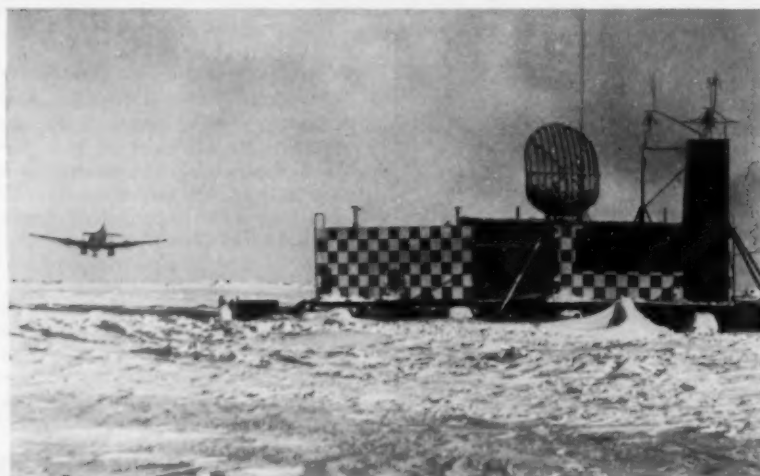
Settlement gauges were installed in the area to permit Turnpike authorities to maintain a continuing check on the fill, which settled 2 ft. and reached approximate stability during 1954 summer, as a result of jetting.

REPORT ON BUILDING THE DEW LINE

**On the rim of the world, construction men...
using airlifts, Cat-powered tractor trains, and
ingenuity...are buying the nation precious
time against a sneak H-bomb attack**



CAT TRAINS complete transportation of material from the United States to construction bases on the DEW line. D8s tow loaded sleds across ice to the final installation sites.



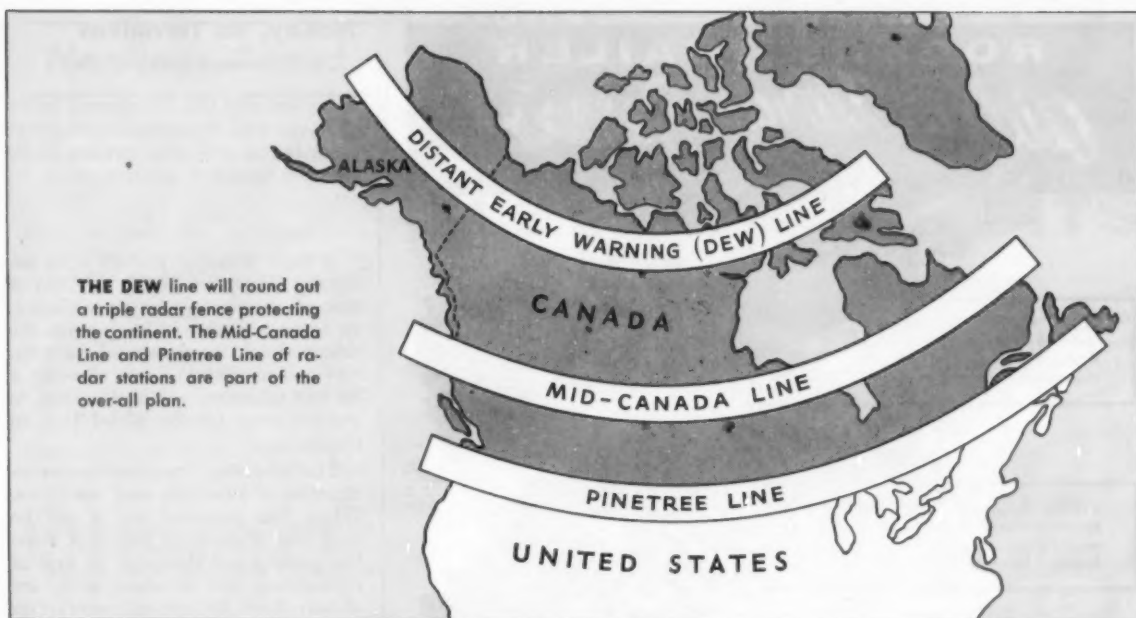
C-124 GLOBEMASTER, loaded with material for the Cat trains, approaches for a landing on a snow-covered landing strip. This strip was carved out by Caterpillar-built Bulldozers which cut snow down to bare ice.

Eighteen hundred miles north of Chicago, temperatures plunge to 70 below, blowing snow cuts visibility to zero, and sparse vegetation shatters like glass. Here construction men and machines are battling to carve out the world's greatest Arctic defense project—the Distant Early Warning (DEW) line, a joint U. S. Canadian venture.

When finished they will have wrung from the Arctic wastes vital extra warning time against a sneak aerial attack. An uninterrupted line of radar stations will maintain a never-ending vigil.

Men and material began moving swiftly and silently inside the Arctic Circle early this year. Ice roads and complete camps were built where none existed a few weeks before. Men and machines had moved in by airlift and CAT*-powered tractor trains.

That was the end result of two years' research and study spearheaded by Western Electric, Bell Telephone System's manufacturing and supply unit. In February, Western Electric



was named prime contractor for the DEW line construction. Subcontractors include Puget Sound Bridge and Dredging Company and Johnson, Drake and Piper, Inc., both of Seattle; the Northern Construction Company and J. W. Stewart, Ltd., of Vancouver; and Foundation Company of Canada, Ltd., of Montreal.

Backbone of each of the spreads is Caterpillar* Arctic-proof equipment. It has proved itself building Thule Air Base in Greenland. It has hauled supplies for the Naval Petroleum Exploration Program at Point Barrow. For decades it has served the commercial needs of industry of the north in mining, construction, pulp and similar operations.

To get the job done it was natural for DEW line subcontractors to rely on their fleets of D4s, D6s, D8s, No. 12 Motor Graders, Traxcavators*, Cat Scrapers and Electric Sets.

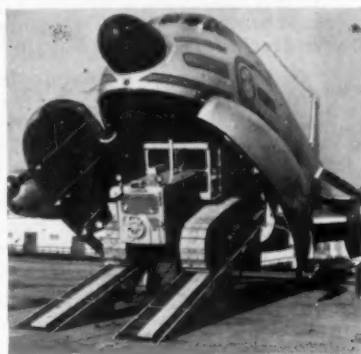
Cat trains moved above the Arctic Circle making landing strips and blazing new snow roads through the

meager stands of hoar-frosted vegetation which reacted like glass when snapped by bulldozers. Other Cat units followed, flown into the landing strips in the Air Force's big airlift, "Operation Big Haul."

Altogether 6600 tons of tractors, buildings and other heavy equipment were brought in by the Tactical Air Command's 18th Air Force. At the airstrips, construction crews put together hundreds of small prefabricated buildings and bolted them to rounded timbers which served as sled runners. Trains of them were towed by Caterpillar track-type Tractors to various Arctic sites.

All big yellow machines have been winterized to withstand temperatures as low as 70 below. The foresight has paid off. On February 15, nine D8s, all equipped with Caterpillar's new oil clutches, were at a point where the mercury dropped to an all-time low of 76 below! *No trouble was reported!*

A few refinements have been added,



A D8 is pulled aboard a Globemaster as part of the DEW line airlift at an Alaskan base. Tractors made up a good part of the 6600 tons of cargo which the Air Force flew to advance bases.

such as escape hatches for operators of tractors in the event they drop through the ice.

Today, north of the Arctic Circle, the painstaking research which goes into all Caterpillar equipment is paying off. For on this vital project . . . on this toughest of all proving grounds . . . only the most dependable equipment can be trusted. Once again the choice has been Caterpillar.

CATERPILLAR TRACTOR CO., PEORIA, ILLINOIS, U. S. A.

*Cat, Caterpillar and Traxcavator are registered trademarks—®

. . . for more details circle 178, page 16

ROADS AND STREETS, July, 1955

ROGERS TRAILER *Aids to Atomic Research*

97 ton atom-smashing coil moved by R. R. Schubert of Butler, Pa. on a Rogers 75 ton capacity I beam trailer.

240,000 lb. synchro-cyclotron was hauled on a 75 ton capacity Rogers I beam trailer.



In this amazing scientific age there is a general inclination to accept progress with little thought as to the vast knowledge, skill and facilities required to attain it.

Take, for example, atomic development. Of basic importance is the scientific research. Next required are the engineering and mechanical operations to translate this knowledge into electrical and mechanical components. Then comes the problem of moving these heavy, valuable parts to the laboratory.

Consider the case of the Carnegie Institute's Nuclear Research Laboratory at Saxonburg, Pennsylvania. After a water trip of 3600 miles two expert riggers were engaged to move the atom-smashing coil and synchro-cyclotron from the waterfront to laboratory. Both of them entrusted their precious loads to Rogers Trailers.



**YOU GET MORE
FOR YOUR MONEY
IN A
ROGERS
TRAILER**

EXPERIENCE
builds 'em

ROGERS BROS. CORP.
ALBION, PENNA.

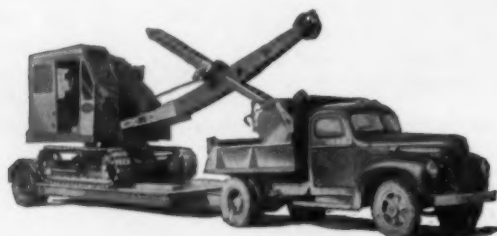


PERFORMANCE
sells 'em

CABLE: BROSITES

Export Office: 50 Church St., New York 7, N. Y., U. S. A. Cable Address: BROSITES

110 Orchard St.



Also of timely interest in this ROGERS Tag-A-Long trailer which makes a dump truck serve as a tractor and effects sizeable savings for contractors.

... for more details circle 236, page 16

McKay, on Turnpikes

(Continued from page 86)

of us feel that this has insured better drainage and therefore longer pavement life as well as a modern traffic accident guard.

...

A third principle learned from designing Turnpike No. 1 in Ohio is that of anticipating future widening. In areas adjacent to large cities the design should be developed for a future added (third) lane, allowing a 96 foot minimum width of median to provide room for the added lane on the inside.

The necessity for three-lane construction is inevitable near our cities. When thus provided for, it can be built later at relatively little cost, since the grading and drainage, as well as right-of-way and structure work, are already done. No serious construction problems are involved; materials can be conveyed over the existing roadways without traffic interference.

(Editor's Note: No reference was made directly to the costly widening job now in progress on the New Jersey Turnpike, but it is believed that Mr. McKay has this project in mind.)

The \$500 million Ohio Turnpike Project 2, now being planned for construction in 1956, will be designed for such future expansion of capacity.

...

Among the many industry pressures and quarrels in connection with turnpike planning in Ohio, the oil industry has caused us the most concern. They quarreled over the pavement type, and more recently showed concern over a possible monopoly in restaurant and gasoline station service. No constructive solution was ever offered by this industry, which finally after long delay came up with the publicized "Indian Village" idea — that of permitting from two to four competing gasoline companies to have adjoining stations in a row at service areas, to insure competition. This duplication of facilities was not adopted. Rather, we now have five major oil companies at 16 locations along the 241-mile route. The turnpike financed the buildings, and the companies operate them under competitive bids. No single company was allowed to have more than 25% of the stations, or stations in sequence.

Also new is the policy of requiring gasoline and restaurant purveyors to sell at prices competitive with prices in their respective vicinities.

Meetings Ahead

NATIONAL ASSOCIATION OF COUNTY OFFICIALS — Annual convention, John Marshall Hotel, Richmond, Va.; July 17-20.

WESTERN ASSOCIATION OF STATE HIGHWAY OFFICIALS — Annual meeting, Jackson Lake Lodge, Wyo.; Sept. 8-10.

THIRD ARBA NATIONAL HIGHWAY CONFERENCE OF COUNTY ENGINEERS AND OFFICIALS, sponsored by the ARBA County and Local Roads Division, New Riverside Hotel, Gatlinburg, Tenn.; Sept. 12-14.

CANADIAN GOOD ROADS ASSOCIATION — Annual meeting, Banff, Alberta; Sept. 13-16.

AMERICAN PUBLIC WORKS ASSOCIATION — Annual meeting and equipment exposition, Hotel Schroeder, Milwaukee; Oct. 2-5.

AMERICAN ROAD BUILDERS ASSOCIATION — 54th annual convention and Highway Materials and Supplies exhibit, Municipal Auditorium, Miami Beach; Jan. 11-14, 1956.

Wyoming host to WASHO meeting in September

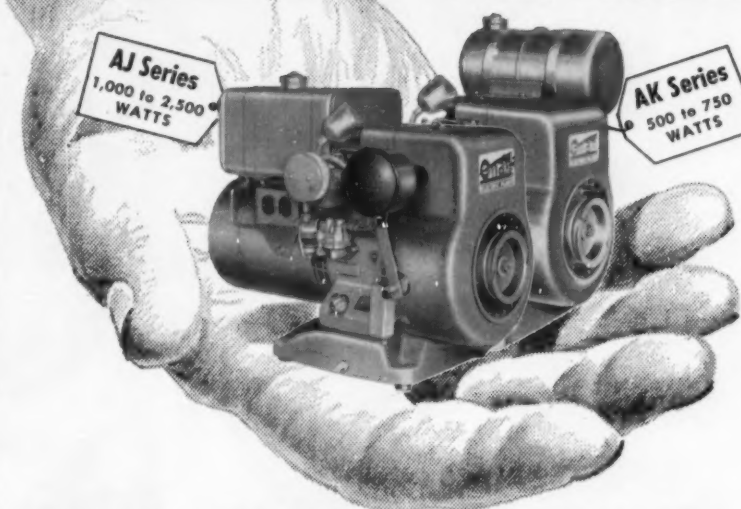
Wyoming's fabulous Jackson Hole country will provide the setting for the 34th Annual Conference of the Western Association of State Highway Officials when the group convenes this fall. J. R. Bromley, Highway Superintendent and President of the Association announced that the newly-completed Jackson Lake Lodge will be the site of the meeting scheduled for September 8, 9 and 10, 1955.

The WASHO group is composed of highway and road-building officials in the western United States, Texas and the Territories of Hawaii and Alaska.

The following chairmen will direct activities for the meeting: T. D. Shepard and Kirby H. Olds, committee coordinators; Ross G. Stapp, program committee; W. E. Sutton, registrations and reservations; R. J. Templeton, transportation; Thomas E. Kilty, publicity, press and photographs. T. P. Hartney, finance; G. T. Bath, arrangements; I. E. Russell, entertainment; Wesley K. Wiker, exhibits and favors; Homer Oxley, welcoming committee; Mrs. C. J. Kriz, ladies program; and Mrs. Asa Jarrett, ladies welcoming committee.

Last year's conference, which was held in Sun Valley, Idaho, attracted 479 delegates from 23 states and territories.

ONAN Announces Two New Series of **POWER PACKED ELECTRIC PLANTS**



MORE POWER, LESS WEIGHT, SMALLER SIZE, LOWER COST!

2,500-watt unit weighs only 154 pounds! Gives you more power per dollar than any other 4-cycle electric plant.

Higher output in a smaller, lighter package gives these new Onan units marked advantages for every type of service . . . portable, mobile, primary, or emergency standby.

Wherever you use *portable* electric plants, you can now put more cost-cutting electric light and power to work for you . . . at less cost. In *mobile* applications you can take along more power in less space . . . with less weight. In *primary* and *emergency* standby applications you get more power at less cost with all the Onan advantages of quick starting, long life and easy maintenance.

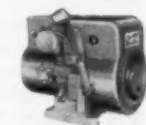
These new units are *completely Onan-built*, with Onan engines direct-connected to Onan generators in a single compact unit. The new, modern, *short-stroke*, single-cylinder, 4-cycle engines feature extra-large bearings and free-breathing intake and exhaust systems to give you thousands of hours of operation without major servicing. Generators are drip-proof and specially insulated for all-climate, all-season use.

Equipped with carrying frames or two-wheel rubber-tired dollies, Onan AJ and AK series electric plants can be taken anywhere . . . moved around easily on the job.

See your Onan distributor or write for new folder describing all 18 new models



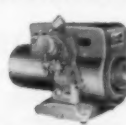
POWERED BY MODERN SHORT-STROKE ENGINES



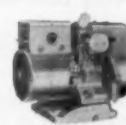
AK A.C. MODELS
500 and 750 watts, 115 or 230 volts.



AK D.C. MODELS
(Battery chargers) 500 and 750 watts, 6, 12, 32 volts.



AJ A.C. MODELS
1,000 and 2,500 watts, 115 or 230 volts.



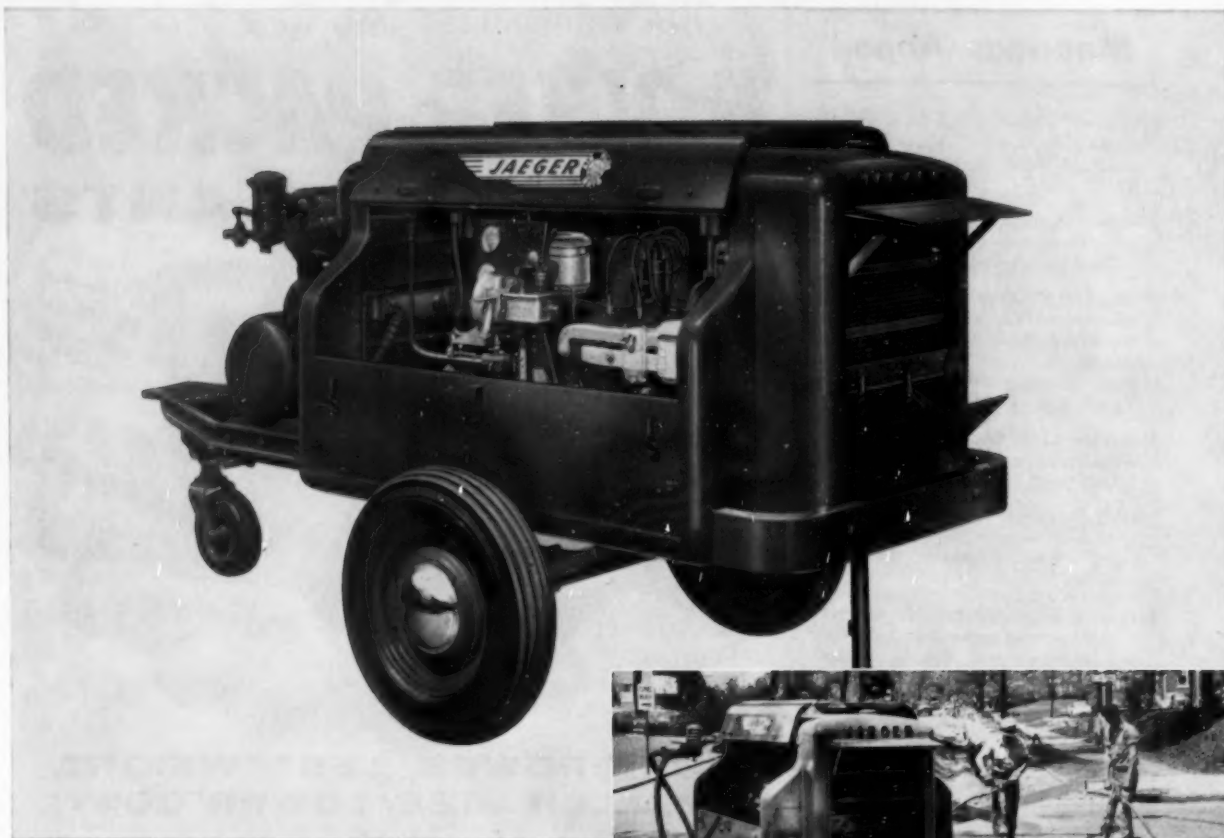
AJ D.C. MODEL
(Battery Charger) 1500 watts, 32 volts.



D. W. ONAN & SONS INC.

3451 University Ave. S.E., Minneapolis 14, Minnesota

... for more details circle 229, page 16



ROTO 125 operated two 80 lb. pavement breakers at full efficiency on this conduit job, line cutting and breaking 1200 sq. ft. of brick under asphalt per 8 hour shift with an average consumption of only $1\frac{1}{2}$ gallons of fuel per hour.

Now we can announce what users have known for a year

Jaeger Roto air-plus is the first

Instant air delivery, exactly regulated to demand, maintains constant pressure as smooth as steam.

High efficiency results in slower operating speeds, the lowest fuel consumption and longest engine life of any rotary compressor.

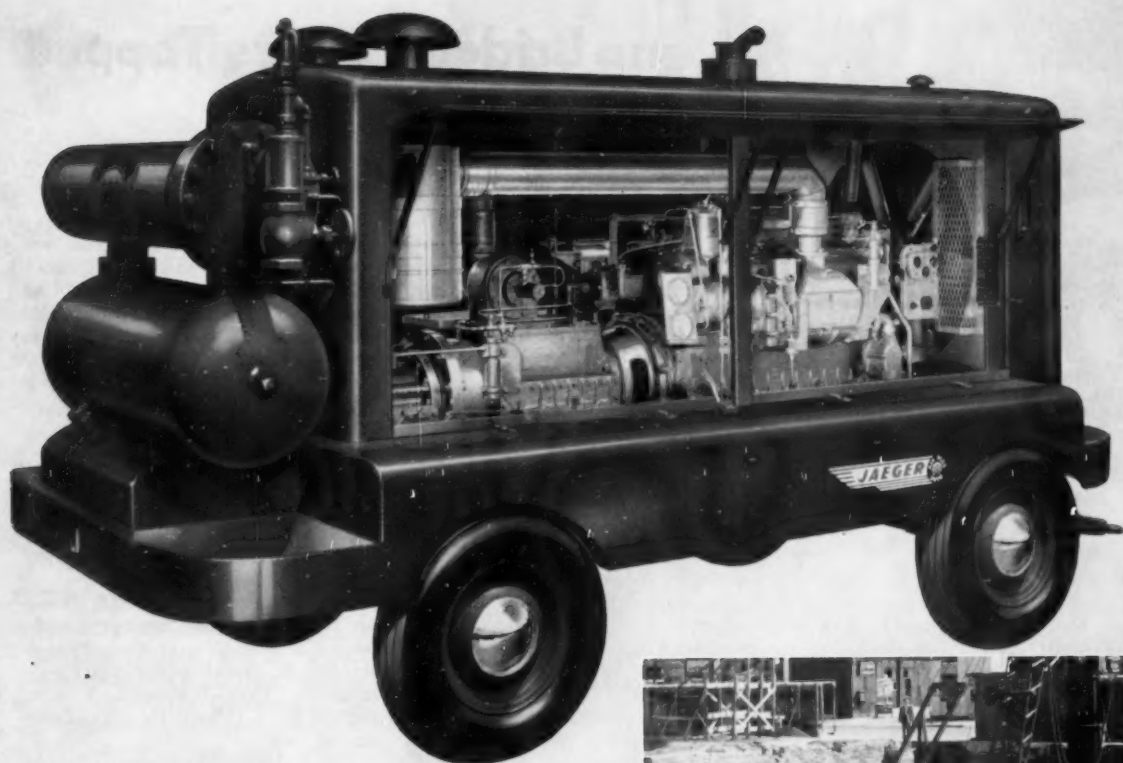
After 5 years development work, Jaeger engineers perfected the first fully efficient 2-stage oil-cooled rotary compressor early in 1954. Since then, Jaeger "Roto" units have logged thousands of hours on all types of application from street work to heavy rock drilling and pile driving.

Performance has consistently excelled even the best of other rotary compressors. On typical quarry work, for example, operating two 4" wagon drills with air-tugger hoists in hard limestone, 10 hours a day, a Jaeger Roto

"600" averaged 7 gallons of fuel an hour in 2200 hours of operation. Its engine never ran faster than 1600 rpm. A Roto "125", handling the air demands of two heavy duty paving breakers, shows an equivalently low fuel consumption of approximately $1\frac{1}{2}$ gallons an hour.

Simple, close, continuous control

Control of engine and compressor is so effective that 100 lbs. minimum pressure is constantly maintained over the entire operating range. Speed modulation is smooth and stepless. Instantaneous control positively prevents overrun and resultant racing of the engine. Furthermore, controls are extremely simple, without metering orifices, complex linkage or toggles. When starting, you merely make one half-turn of a regulator crank to set engine fuel control on "Idle." All controls are conveniently grouped on one side of the compressor.



ROTO 600, holding steady 100 lbs. pressure for 160 working hours (as smooth as steam) kept this Vulcan No. 1 hammer hitting 60 full power blows per minute, with air to spare for breaker and clay spade work.



fully efficient rotary compressor

There are many further advantages. Jaeger's copper tube finned multi-pass oil cooler insures cool operation in over 100° weather. Automatic by-pass valve means no "dry starts" in cold weather. Multiple perforated disc oil filters won't corrode, absorb or freeze. Adjustable radiator shutters maintain engine water temperature on sub-zero days. All sizes have accessible 8-hour fuel tanks. Tool boxes on the "125" hold a full set of tools.

Available in 125 and 600 cfm sizes

To meet the principal demands of users who prefer the rotary type compressor, current production of the Jaeger "Roto" is concentrated in the popular 125 and 600 cfm sizes. For the many air users who still prefer the piston type, Jaeger reciprocating Air-Plus compressors continue to be available in the "new standard" ratings with the exception of the 600 cfm size.

... for more details circle 212, page 16

ROADS AND STREETS, July, 1955

For complete information see your Jaeger distributor or send for Catalog JCR-5.

THE JAEGER MACHINE COMPANY

223 Dublin Avenue, Columbus 16, Ohio

PUMPS • LOADERS • MIXERS
TRUCK MIXERS • PAVING MACHINES



Bridge Towers Topped

● Jacking frame in position on top of upper strut, while bridgemen watch progress of closing section being hoisted up to their level. Final section will fit snugly into gap at right of engineer.

Strut helps solve lean and deflection problems during erection of upper tiers of tower and setting of permanent top street frame

AN 87-foot-long fabricated steel spacer strut—as well as a special jacking frame—is being used by Bethlehem Steel Company in cantilevering into place the 9 upper strut sections of towers of the South Philadelphia-Gloucester Bridge over the Delaware River.

The spacer strut, once placed in its temporary horizontal position, serves to counter deflection of the tower legs, each of which weighs 2,500 tons. When 6 to 8 of the permanent strut sections are in place, their added weight would pull the legs a total of 4 inches toward each other if the spacer strut were not there to hold them to the vertical.

Weighing 7½ tons, the spacer strut is a box member consisting of four angles laced together. It is 4 ft. high and 6 ft. 9 in. wide, back to back of angles. Positioned at the tower's center line, it is placed at the top of tier 9, just under the upper strut. The permanent strut frames to tier 10 at the top of the tower, which rises 370 ft. above water level.

At each end, the spacer strut is supported by a bracket fastened to the vertical splice of the tower leg. Also at each end shims are placed between the strut and the tower leg to make the fit tight. The spacer strut was designed for a thrust of 100 tons.

When the spacer strut is set up, the bridgemen proceed to cantilever the permanent strut sections, weighing 35 to 51 tons each (in the case of the upper strut only), out from the tower legs. The jacking frame is then set up on top of the cantilevered sections to assist in getting the center or ninth main strut section into place.

The 5-ton jacking frame includes

two jacking columns (WF beams) 19 ft. long and set 17 ft. apart. They are supported by two jacking (WF) beams bracketed to the strut.

Two 100-ton capacity Watson-Stillman jacks set 16 ft. apart along one jacking beam supply enough force to push the tower legs apart. The opening for the center strut section is jacked to ½ in. more than final.

The same jacking frame is employ-

ed to erect the lower strut, which is secured to tier 4 and weighs about 500 tons. However, in this case the jacking columns are set 25 ft. apart. The lower strut sections range in weight from 41 to 59 tons apiece.

Total weight of the upper strut is about 400 tons. In using the spacer strut to erect it these advantages are gained:

1. Excessive lean of the tower legs on the creeper traveler is prevented.
2. Further inward deflection of the tower leg is precluded, thus easing the jacking problem.

The creeper traveler, which moves up the face of the tower on track beams, is used to erect tower tiers 4 through 10, as well as upper and lower struts. Tiers 1 through 3 were erected by a 115-ton capacity tower derrick boat.

The \$90,000,000 suspension bridge is being built by the Delaware River Port Authority. Modjeski and Masters,

● Closing section being jockeyed into place, while jacking frame keeps opening wide enough for it. Note on top of each tower leg the 42-ton cast steel saddle which will support suspension cable.



Out with Special Strut and Jacking Frame

Consulting Engineers, of Harrisburg, Pa., are the designers. Contractor on foundations, etc., is Fehlhaber Corp., of New York City. The steelwork is being erected by Bethlehem Steel Company's Eastern Erection District under G. P. Bullard, manager of erection, with M. A. Matlock, his assistant in direct charge. At the site, V. Assetto is resident engineer and Oscar Brunn is superintendent.

Both the spacer strut and jacking frame were fabricated at Bethlehem's Pottstown, Pa., works.

CIMA group appoints officers

Kenneth Lindsay, of Iowa Manufacturing Company, has been appointed chairman of the Construction Industry Manufacturers Association, Executive Committee for 1955, with P. H. Birkhead, of Bucyrus-Erie Company, vice-chairman.

Other members of the Executive Committee include E. F. Bentley, Detroit Diesel Engine Division, GMC; O. J. Ellertson, Pioneer Engineering Works, Inc.; W. A. Nugent, Thor Power Tool Company; Frederick Salditt, Harnischfeger Corporation; Gail E. Spain, Caterpillar Tractor Company; Julien R. Steelman, Koehring Company; Frank J. Whelan, Worthington Corporation.

Julien R. Steelman of the Koehring Company has been made chairman of the committee for the 1957 Road Show; C. J. Haring, Westinghouse Air Brake, has been made vice-chairman, with members including J. T. Callaway, Goodyear Tire and Rubber Company; Boyd S. Oberlink, Allis-Chalmers Manufacturing Company and C. B. Smythe, Thew Shovel Company.

A sub-committee on space allocation at the Road Show includes Boyd S. Oberling, chairman; C. F. Boyd, Galion Iron Works & Manufacturing Company; H. A. Scribner, Russell T. Gray, Inc.; and W. McK. White, Sr., White Manufacturing Company.

Another important sub-committee for the Road Show concerned with rules and space qualifications include C. J. Haring, chairman, Westinghouse Air Brake Company; W. B. Greene, Barber-Greene Company; and Ralph



● Closing 35-ton section of upper strut being lifted into place in Gloucester tower of South Philadelphia-Gloucester Bridge. Spacer strut, which was removed after creeper traveler was jumped and packing frame was put in place, has been lowered to main pier working platform (behind left leg of tower).

K. Stiles, Austin-Western Company.

Of interest to contractors throughout the nation is the makeup of the CIMA-AGC Joint Committee. CIMA representatives include W. B. Greene, chairman, Barber-Greene Company; P. H. Birkhead, Bucyrus-Erie Company; J. T. Callaway, The Goodyear Tire & Rubber Co., Inc.; Carleton R. Dodge, Northwest Engineering Company; A. A. Levison, Blaw-Knox

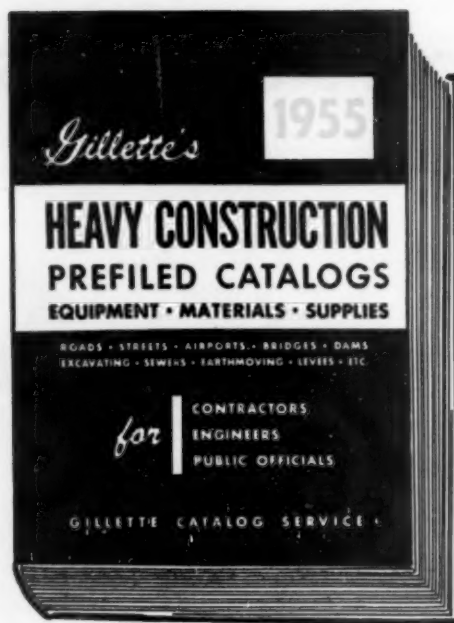
Equipment Div. of Blaw-Knox Co.; Ray McLean, The Jaeger Machine Company; Harold T. Reishus, International Harvester Company; Frederick Salditt, Harnischfeger Corporation; C. B. Smythe, The Thew Shovel Company; Gail E. Spain, Caterpillar Tractor Company; Julien R. Steelman, Koehring Company; Ralph K. Stiles, Austin-Western Company; Harold F. Hess, Co-Secretary, CIMA.

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. . . and here are some reasons why you should be USING IT DAILY!

- Catalogs are PREFILED — saving you time and space required to file individual manufacturers' catalogs.
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Here are the manufacturers represented in Gillette's Heavy Construction Prefiled Catalog:

- | | |
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| Aeroil Products Company | Heltzel Steel Form & Iron Co. |
| American Steel & Wire Div. | Henry Manufacturing Co., Inc. |
| Anthony Company | Hogan Company |
| Armco Drainage & Metal Products, Inc. | Hough Company, F. G. |
| Austin-Western Company | Huber Manufacturing Co. |
| Badger Machine Company | Ingersoll-Rand |
| Barber-Greene Company | Jackson Vibrators, Inc. |
| Bicknell Manufacturing Co. | Jay Manufacturing Company |
| Blaw-Knox Company | Keystone Asphalt Products Company |
| Briscoe & Son, E. B. | Kiesler Company, Jos. F. |
| Bros Boiler & Mfg. Co., Wm. | La Crosse Trailer Corporation |
| Buffalo-Springfield Roller Co. | Le Roi Company |
| Butler Bin Company | Littleford Bros., Inc. |
| Carey Manufacturing Co., Philip | McKiernan-Terry Corporation |
| Chrysler Industrial & Marine Engine Corp. | Mid-Western Industries, Inc. |
| Clark Equipment Company | Minneapolis-Moline Company |
| Cleveland Trencher Company | Naugatuck Chemical Div. |
| Colorado Fuel & Iron Corp. | Owen Bucket Company |
| Concrete Surfacing Machine Co. | Pacific Car & Foundry Co. |
| Continental Motors Corporation | Pioneer Engineering Works, Inc. |
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| Flintkote Co. | Shunk Manufacturing Co. |
| Galion Iron Works & Mfg. Co. | Stow Manufacturing Co. |
| Gar-Bro Manufacturing Co. | Symonda Clamp & Manufacturing Co. |
| Gar Wood Industries, Inc. | Timken Roller Bearing Co. |
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New Concreting Method Saves 28 Days

Concrete placed in deep foundation using ready-mixed concrete and 8-in. rubber hose sections. Adaptable to bridge foundation and other problems encountered in road work

By Earl Tabler

Concrete Engineer, Machinery Division, Dravo Corporation, Pittsburgh, Pa.

PLACING 15,000 cu. yd. of foundation concrete over a reach of 120 ft., and 52 ft. below grade, in only five months' time, was a problem Dravo Corporation had to solve in the construction of a new addition to the Frank R. Phillips power station of the Duquesne Light Company at Pittsburgh.

Located on the Ohio River about 15 miles below Pittsburgh, the river and existing plant took up two sides of the structure so that only two were left from which to approach the work. The two working sides consisted of six steel-sheet piling cells. The distance from the edge of the cells to the far side of the new unit was about

120 ft. Because of this distance, it was impracticable to work cranes from atop the cells, therefore, some means had to be devised to get them closer to the work.

It was finally decided that temporary trestles built directly in the construction area would be the solution. The trestles were designed for 25 and 50 ton cranes, incorporating H-bearing piles and timber mats. They were located so that they would serve many purposes, including excavation, handling forms and reinforcing steel and pouring concrete. They would also be available to facilitate setting a portion of the structural steel.

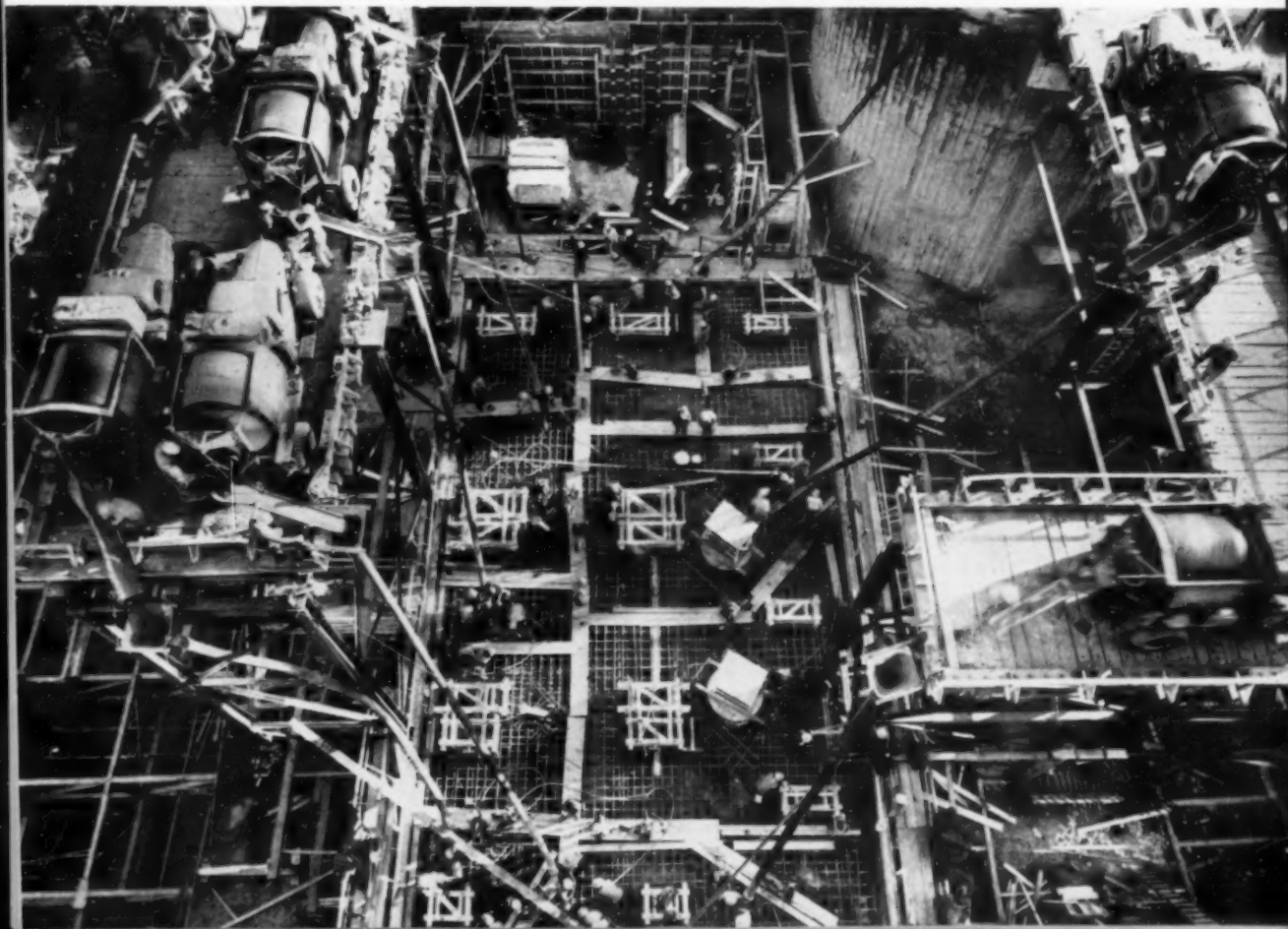
It was first thought that the con-

crete would be poured using 1½ and 3 cu. yd. buckets, but this method was ruled out because of the time element. The use of open chutes was prohibited because of the long drop which would segregate the concrete. Because of the ideal location of the trestle, however, the idea was conceived to use rubber hose to place the concrete.

Experiments indicated that an 8-inch rubber suction hose would work successfully. Because of the abrasive action of the sand and gravel, a special hose of the same size was tried. This type has the following specifications: one extra-heavy rubber tube, five plies of canvas duck, one rubber cover, and it is light and flexible. The only difference between this type and ordinary eight inch discharge hose is the extra-heavy rubber tube. This hose worked successfully and had the advantage over suction hose of being lightweight and flexible.

The hose was attached to 3-ft. sq. tapered hoppers, such as those used for tremies. In turn, the hoppers were

● A total of 1526 cu. yd. of concrete was poured in this section of foundation in eleven hours.



hung from the side of the trestles or cells, as can be seen in the accompanying photograph. From this position, the concrete could be discharged directly from the trucks.

It was attempted to keep the initial length of hose just long enough so that the bottom of it would be about 2 ft. above the top mat of reinforcing. Thus, varying length sections could be attached to the end to keep the discharge within 4 ft. of the concrete level as it built up in the form.

To facilitate changing sections of hose, a quick change coupling was devised. It is a flange coupling in design, with two swivel bolts on opposite sides of one flange, fitting into slotted holes on the other flange. With this arrangement it was possible to change a section of hose in a matter of two or three minutes.

If the hose hung at an angle, it was found that a piece of suction hose should be used in the unsupported spans. This gave added stiffness and reduced the possibility of the hose kinking under the heavy load of the concrete.

One big advantage of using the hose was the fact that a relatively large area could be covered with each one without changing the hopper location. Because of this fact, a complete pour could be made with only

one set-up of hoses. This resulted in making large pours in a short amount of time. The entire "floating slab" foundation was made in thirteen pours with an average thickness of 12 ft.

It was at first estimated that the largest section of foundation which contains 1,526 cu. yd. would take about 36 hours to pour with conventional concrete placing buckets. However, with the use of concrete placing hoses this section was completed in only 11 hours, for an overall average of 138.7 cu. yd. per hour. It was made using nine hoses and a total of forty-two 3 and 5 cu. yd. transit mixers supplied by three nearby batching plants.

155 C.Y. Per hour

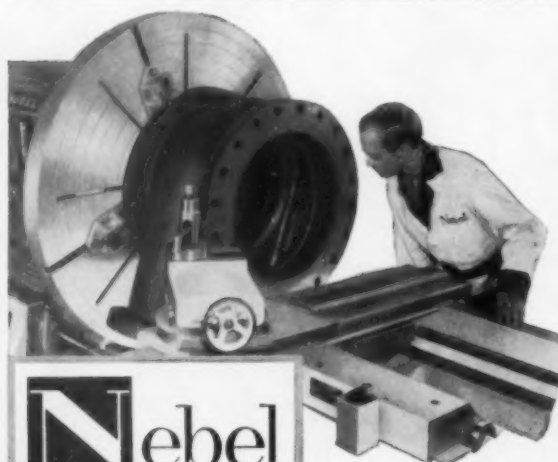
At the peak of the concreting, an average of 155 cu. yd. per hour was attained. Other sections of the foundation were made with a similar time saving in placing the concrete. The time it took to make a particular pour was directly dependent upon the number of hoses used. Usually, 15 to 20 cu. yd. per hour could be expected from each position.

Visual and physical tests proved that the use of the hoses did not impair the quality of the concrete. It was observed that segregation was kept to a minimum by using a section of

hose without a coupling on the discharge end. Since the hose is flexible, its cross section at the outlet was somewhat elliptical in shape. This tended to reduce the velocity of the gravel and gave the concrete a chance to remix before entering the forms.

The concrete specification called for a design strength (f_c) equal to 3000 psi. To get this strength, a 5% bag per cu. yd. mix was used, and a two to four inch slump was maintained as a control over the water-cement ratio. Test cylinders were taken at both the top and bottom of the hose in three different pours for experimental purposes. The results ranged from 3150 to 4560 psi for the samples taken at the top and from 3010 to 4840 psi for the samples taken from the bottom.

From these tests it was quite evident that the quality of the concrete was not reduced by placing it through a rubber hose. Although it was demonstrated that concrete could be successfully placed with this method, it must be pointed out that it was only made possible because of the ideal situation that existed. However, as a result of the combination of the construction trestles and using rubber hose as a placing media, the concrete was expedited so that the schedule was improved upon by four weeks.



Nebel
LATHES
CINCINNATI

basic maintenance tool

Nebel extension bed gap lathes will turn all your maintenance jobs easily, quickly and inexpensively. The wide, deep gap accommodates outside, odd-shaped parts . . . and with the gap closed, you can do all your engine lathe work as well. Why buy two lathes when one Nebel will do? See Nebel gap and engine lathes at the Machine Tool Show, Chicago, Sept. 6-17 . . . or write for free bulletins, sizes 16"-50". The Nebel Machine Tool Co., Cinti 25, Ohio.

. . . for more details circle 256, page 16

down by the seashore **TATEM** *Surf Club*

Carefree living enhanced by . . . large, cheerful guest rooms . . . private pool, ocean beach, cabana club . . . dining room and cocktail lounge.

Rates from \$8 double,
European \$8 Plan.

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at 43rd Street



MIAMI BEACH

New Publications

ASTM 1954 Proceedings

The 1954 edition of the ASTM Proceedings, recently published, is a 1400-page record of technical accomplishments. It includes many technical reports and papers together with discussion which has been offered to the Society during the year.

Reports of the technical committees, of which there are 68, and their appendices provide a wealth of useful technical information as do the 37 technical papers and discussions on a wide variety of subjects pertaining to research and testing of materials.

In addition to the papers and reports, there are listed in the table of contents all symposiums published separately as Special Technical Publications (STP's) and all papers published in the ASTM Bulletin.

The Proceedings contain much discussion that has been submitted and not previously published. Copies may be purchased from American Society for Testing Materials, 1916 Race Street, Philadelphia 3, Pa. Price is \$12.00.

TRENDS IN LAND ACQUISITION. Contains report given to the Highway Research Board's annual meeting, January, 1954, by the Committee on Land Acquisition and Control of Highway Access and Adjacent Areas. The report indicates significant developments in the fields of the committee's activities for the year 1953. It also contains four papers presented at the open session of the committee held during the Board's Thirty-Third Annual Meeting.

Three of the papers deal with land-use controls as they affect highway programs: "Bringing Zoning up to the Automobile Era," by Hugh R. Pomeroy; "Protection of Highways and Feeder Streets through Subdivision Controls," by J. H. Beuscher; and "Zoning Approach to the Chicago Parking Problem," by Robert J. Kelly.

A fourth paper, "Controlling the Use of Access," by Clifton W. Enfield and John C. McLean, delineates the pioneer effort of the Oregon State Highway Commission to protect its highways from indiscriminate roadside development through the device of regulating the use to which access is put.

Price \$1.50. Sent on request to the Board at 2101 Constitution Ave., Washington 25, D.C.

ROADS AND STREETS, July, 1955

HORSEPOWER

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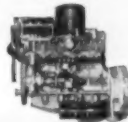
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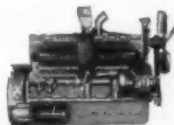
... for more details circle 203, page 16



Hercules Model NXB
2 cylinder gasoline engine
15.6 H.P.



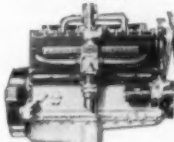
Hercules Model DODD
4 cylinder diesel engine
79 H.P.



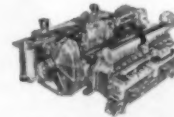
Hercules Model JXD
6 cylinder gasoline engine
112 H.P.



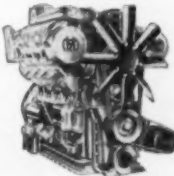
Hercules Model DIX6D
6 cylinder diesel engine
93 H.P.



Hercules Model HXE
6 cylinder gasoline engine
236 H.P.



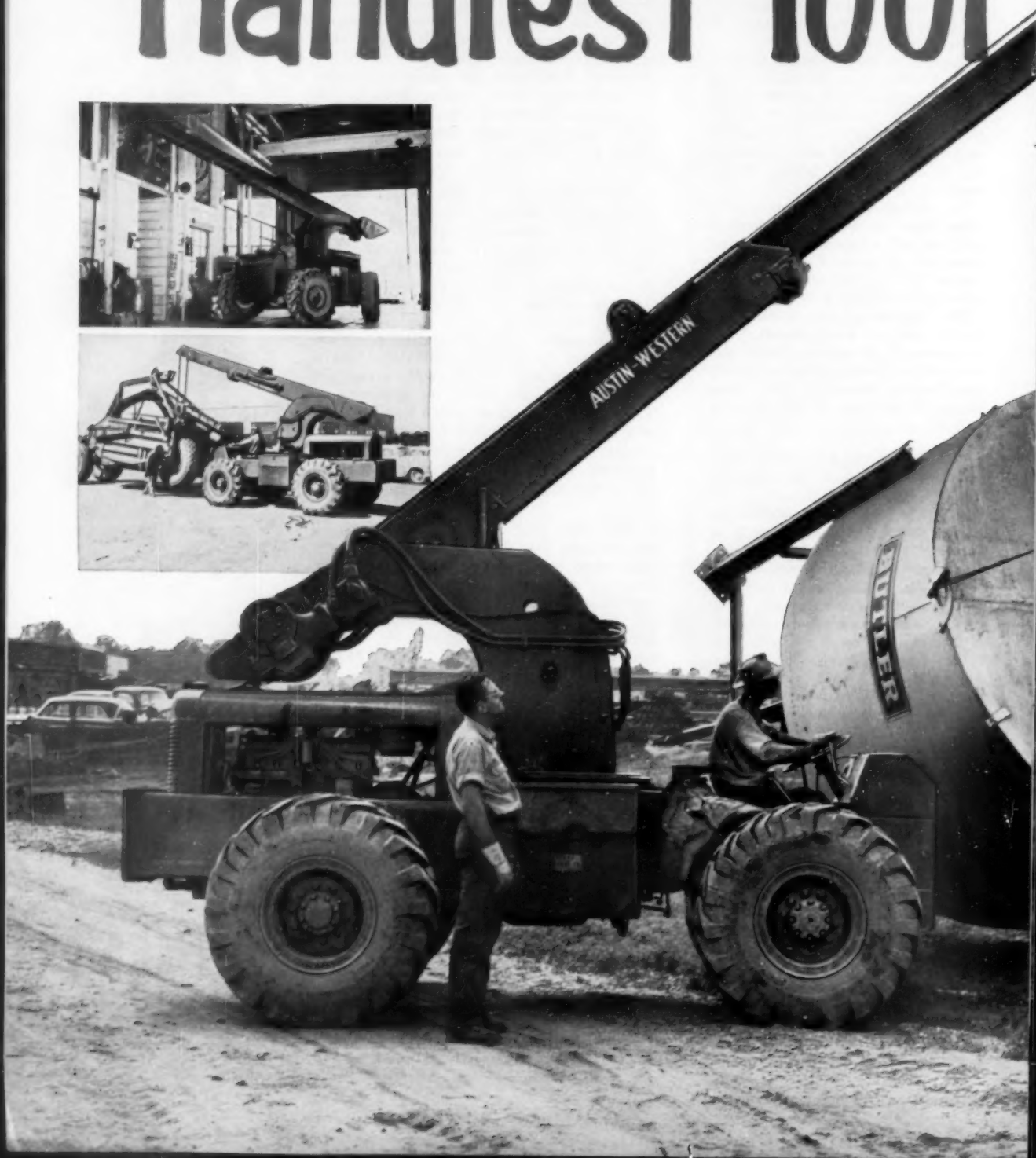
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Traffic Safety and Control

Outer edge stripe being tried in Louisiana

The Louisiana department of highways is experimenting with an outer edge stripe to delineate the pavement from shoulder. The marking is expected to pull traffic away from the center line and further over to the side of the highway. "Many head-on accidents are now caused by opposing vehicles 'crowding' the center lines of the highways," notes highway director George S. Covert. "If drivers can clearly see the outer pavement edge with the new marking, it is hoped that they will travel closer to the right in driving. In addition, if traffic stays closer to the outside of the highway, passing vehicles will not be forced to get completely out of their lanes to see if opposing traffic is approaching."

Five locations totaling 60 miles have been marked to determine driver reaction. The marking consists of a 4-inch-wide band of reflectorized

white paint. The marking is being carried out under Rodney H. Fraser, the department's signing and striping engineer.

Texas road signs getting face lifting

Gradual face lifting on a state-wide basis is being accomplished for road signs by the Texas Highway Department. Following the new specifications of the revised Manual on Uniform Traffic Control Devices for Streets and Highways, the principal changes are:

1. AASHO alphabet style is being put into effect. This provides for a choice of six series of lettering styles of different height-width ratios ranging from expanded to condensed, to permit fitting a message to a sign blank instead of vice versa.

2. The department is continuing a program of increasing the mounting height of signs by 2 ft. to lessen the effect of mud splash. Larger sign size is also a trend where over-size is shown to be needed. Some signs are larger than the AASHO minimum standard.

The program is largely on a "maintenance replacement" basis as old signs wear out.

Washington state testing colored route markers

As an experiment toward improving the flow of out-of-town traffic through urban areas, the Washington Department of Highways has recently installed colored U.S. route markers in Seattle, Spokane and Olympia. A different color is being used for each cardinal direction: orange for northbound, blue for westbound, brown for eastbound and green for southbound. For instructing drivers entering each city, large example signs have been posted at the outskirts which picture each of the colored indicators.

To date, there has been mixed public reaction to the idea from motorists. State officials intend to continue the experiment until conclusive results can be determined before expanding the use of colored markers in other urban areas. Rex G. Still is traffic engineers.

● A new all-time traffic record was set on the Pennsylvania Turnpike over Memorial Day weekend. On Monday, May 30, the toll gates passed 79,815 vehicles on the 360 mile system. The total for the 4-day holiday period was 271,179 vehicles, exceeding the previous holiday record by 9.1%.

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Prestressed Concrete Costs

By H. Kent Preston, Assoc. Mem. A. S. C. E.

Engineer, Construction Materials Division, John A. Roebling's Sons Corporation

Data on current and percent costs are presented in this exclusive article, based on questionnaire replies from contractors experienced in prestressed concrete work.

THE use of prestressed concrete in the United States has grown by leaps and bounds since the first structures were completed in the Fall of 1950. Knowledge of design and construction techniques has grown through numerous reports on actual structures and research projects.

Now, knowing how to design and fabricate it, many architects and engineers are saying, "I would use prestressed concrete where it is economical, but I have no cost data to tell me where this is and I haven't the time to make a standard design plus a prestressed concrete alternate."

The same thing is true of the man who would like to set up a plant for fabricating but hasn't enough cost data to know what type of members would compete with other materials in his particular area.

A questionnaire seeking information on prestressed concrete costs was sent to a number of firms who have been active in prestressed concrete construction. The following data, assembled from the replies, represent average costs which will obviously vary with labor rates, size of job, amount of competition, etc.

Pre-Tensioned Bonded Type

Although the questionnaire included spaces for wire and other pre-tensioning elements, the only items included in the replies were 1/4, 5/16, and 3/8 in. 7-wire stress-relieved strands. Properties of these strands are given in Table No. 1. Many engineers use the design and tensioning loads suggested in this table, while some prefer to use a slightly lower tension. The difference in tension does not affect the cost per foot of the strand in place.

Material and Fabrication Costs — The well designed and well equipped plants were notable for their lower

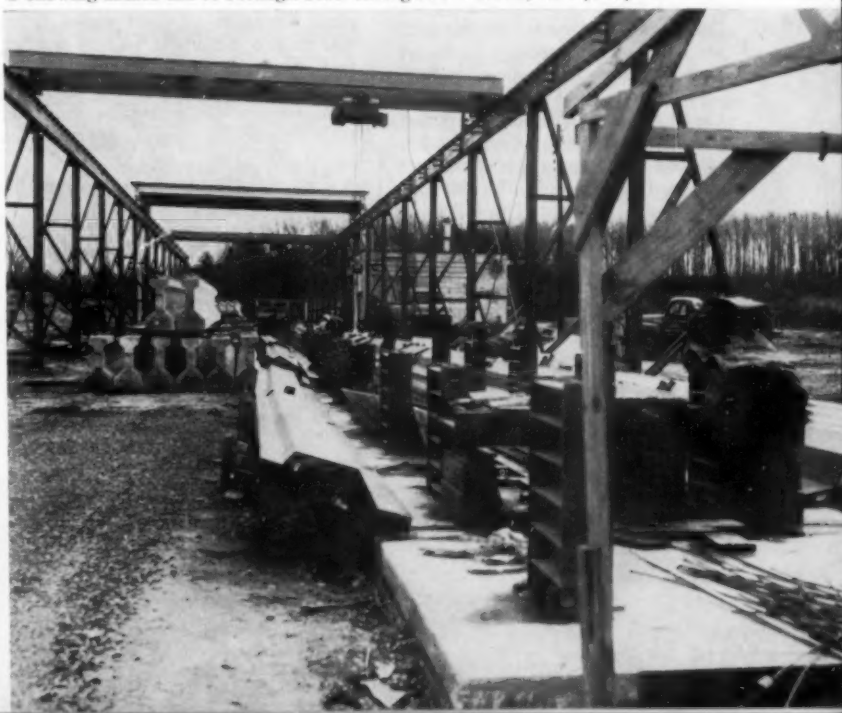
fabrication costs. Their cost for placing and tensioning was practically the same for all three strand sizes and amounted to about 1/2 cent per linear foot of strand. Current mill prices for the strand listed in Table 1 run in the neighborhood of 19¢ to 20¢ per pound in carload quantities, and freight to the farthest point in the United States seldom exceeds 1 1/2¢ per pound. The actual quantity of strand used is 4% to 5% greater than that contained within the members because of the space between the members in the casting bed and the strand in the anchor and jacking connections. The "in place" cost of the strand for any job can be easily computed using the four factors mentioned above. These figures do not include contractor's overhead and profit.

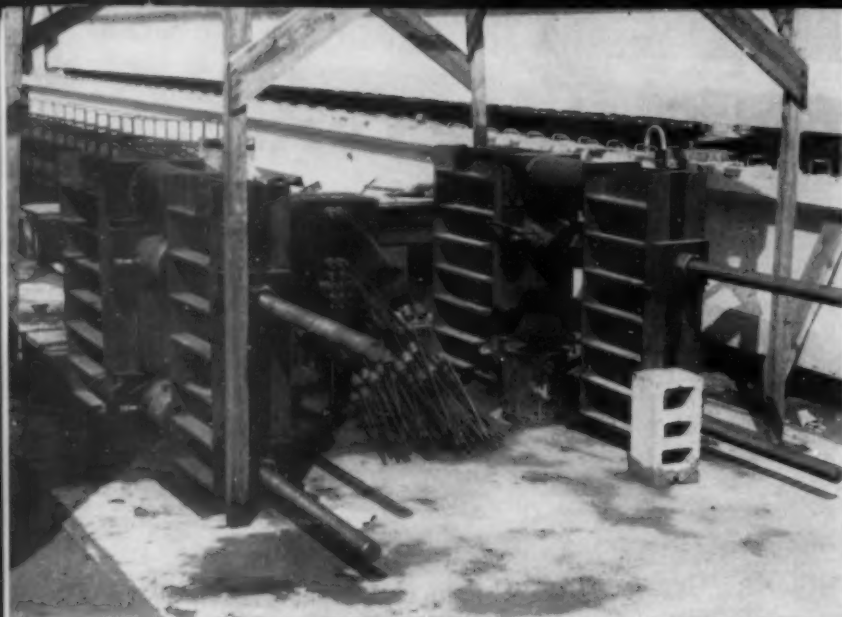
Practically all plants worked to a minimum concrete strength of 5,000 psi. The selling price FOB fabricating plant including overhead and profit for the concrete and reinforcing varied from \$55 to \$100 per cubic yard, but the majority of reports fell in the \$70 to \$80 bracket. The cost of the strand plus the contractor's profit on handling it must be added to the concrete price.

Products — Some 84% of all the business reported was obtained on the basis of lowest price in competition with other building materials. Eight percent of the business was on projects where the specifications required prestressed concrete and the remaining 8% was on projects where the casting bed owner helped the customer to develop the design.

The total production was divided almost equally between heavy members such as bridges and pier decks, and lighter members mostly used in buildings. 60% of the lighter members

● Showing anchor end of Formigli Bros. casting bed at Berlin, New Jersey.





● Jacking end of Formigli casting bed.

went into roof decking, 15% into roof beams and girders, 15% into building floors, and the remainder into miscellaneous members.

For long-span, heavily-loaded members the most popular cross-section has been the modified I which is an I-section having one flange larger than the other. These are often used as stringers with a poured-in-place deck as on the New Jersey Garden State Parkway Bridges. Modified I-sections are placed flange to flange, post-tensioned transversely, and covered with a wearing surface to form a bridge.

Rectangular Members

Shorter-span, heavily-loaded decks are usually made of solid rectangular members or rectangular members with cardboard tubes cast into core holes.

Decks, such as roofs, for carrying light loads are generally made of channel sections, tee sections or double tee sections.

Casting Beds — All plants reported that their casting beds were for either reinforced concrete or post-tensioned prestressed concrete. Equipment varied from plant to plant. The following summation indicates the percentage of the plant owners reporting who had the item of equipment mentioned:

- 56% Hand jacking equipment
- 78% Power jacking equipment
- 67% Vibrators (it is the writer's experience that vibrators more than pay for themselves in the casting of good concrete in pre-tensioned members)
- 10% Concrete mixer
- 100% Re-usable anchor fittings
- 56% Special stands for reels or coils of strand
- 33% Steam curing equipment
- 100% Forms

- 67% Intermediate anchorage stations to eliminate strand wastage
- 10% Vacuum equipment
- 10% Overhead bridge cranes

The number of linear feet of casting bed per plant varied from 150 ft. to 2,550 ft. with an average of 750 ft. of bed per plant. Most plants had two or more beds with the length of most of the individual beds varying from 250 to 400 ft. In some plants one bed is designed for heavy prestressing forces, with the remaining beds designed for fabricating lighter members. The majority of beds were designed for an initial prestressing force of 300 tons. The average plant is equipped to handle a finished member weighing 20 tons.

The cost of the average precasting plant exclusive of land varies from \$50 to \$75 per linear foot of casting bed. This includes the concrete base, power jacking equipment, vibrators, re-usable anchor fittings, stands for reels or coils of strand, intermediate

anchorage stations, a set of standard forms and the services of a consultant to design the bed and standard members to be fabricated. Beds for casting light members only, such as roof channels and purlins, can be installed and equipped for less. For some plants, using steam curing and working at capacity, monthly gross sales were equal to the cost of casting bed and equipment. For other plants monthly capacity was as low as one-half the cost of casting bed and equipment.

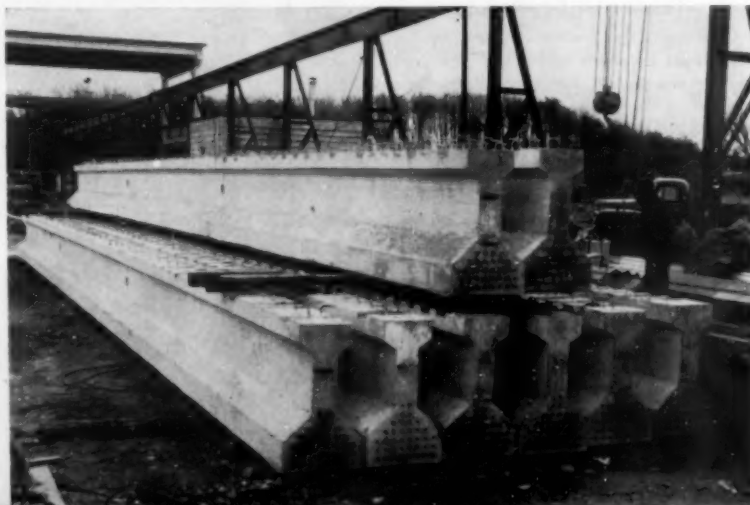
Post-Tensioned Type

Post-tensioning elements being used in the United States include cables made of groups of parallel wires anchored by button-heads on the wires or Freyssinet type cones; strands machine fabricated from wires and anchored with factory attached steel fittings; and high strength bars with specially threaded ends and nuts for anchors.

The material prices in Table 2 include cost of tensioning elements, anchors, flexible metal hose, bearing plates, average freight to job, and cost of placing, tensioning and grouting, but they do not include allowance for contractor's overhead and profit or for supervision by a prestressed concrete engineer. They represent the low-bid price that might be expected on a fair size job where the tensioning elements are worth \$10,000. For large jobs, reductions of 10% to 15% can be realized while for small jobs the cost will naturally go up.

Prices are given for a foot-kip unit of tensioning element. This represents a section of tensioning element one foot long which will deliver a prestressing force of 1,000 pounds after all stress losses have taken place. With this information known, the cost of the prestressing force in a member can be obtained by multiplying the required final prestressing force in

● Girders for Garden State Parkway bridge curing at Formigli's yard.



kips by the length of the member by the cost of a foot-kip unit for the given span. The estimator should remember that the contractor may not have tensioning elements to provide the exact force required and may therefore have to supply and charge for more tensioning steel than is absolutely necessary to create the required tension.

As indicated in Table 2, the cost of post-tensioning elements varies with their length. Interpolation for spans between the points given will give sufficiently accurate readings for estimating purposes.

Cost per cubic yard of concrete for post-tensioned members fabricated in a casting yard will be comparable to that previously discussed for pre-tensioned members. "On the job" costs will be comparable to those for a reinforced concrete member on the same job.

Economy in Design

A study of the preceding costs shows that the cost, in place — tensioned and bonded — for a given prestressing force is much less using pre-tensioned bonded strands than using the post-tensioned method. Take a 3/8 in. dia. pre-tensioned strand as an example:

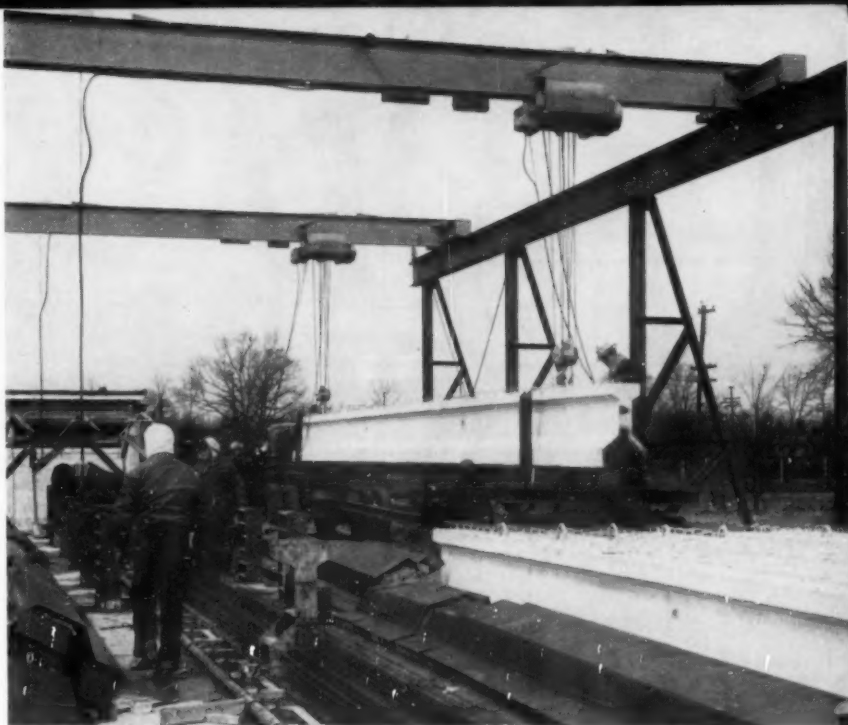
Cost per foot of strand. .51¢
Placing and tensioning.50¢
Freight33¢
Waste 5% of above total. .30¢
6.27¢ per ft.

Since a 3/8 in. strand provides a final tension of 11,200 lb. the cost per foot-kip unit is $1000/11200 \times 6.27 = 0.56¢$. This cost is not affected by the length of the member. Comparing this cost with Table 2 we find that the cost of a given prestressing force in pre-tensioned bonded strands is 37% to 53% of the cost of the same force in post-tensioned members.

Above pre-tensioned prices are based on strands placed in a straight line instead of a curve as with post-tensioned steel. As a result the optimum eccentricity cannot be used and the force needed to prestress a given member is 10% to 15% higher than the corresponding force using curved members.

When the concrete member is deep enough to permit placing the tensioning elements at optimum eccentricity, a given concrete cross section will carry more live-load with curved tensioning elements than with straight. This is because the member with straight strands must carry its dead-load as a bending moment in the concrete whereas the curved cables carry the dead-load without bending stress in the concrete.

It is interesting to note that a few



● Formigli Bros. casting bed, showing strands in place for girder for bridge on Garden State Parkway, but forms not yet placed. Also loading of a girder for trucking to job.

members with curved pre-tensioned bonded strands are now being cast under the supervision of Ross Bryan, Consulting Engineer, Nashville, Tennessee. If these can be made economical, the only limit on pre-tensioned bonded members will be size and weight for shipment from plant to job.

Experience to date indicates that the maximum economical length of members with straight tensioning elements is around 60 to 70 ft.

For spans above 50 ft., serious consideration should also be given to a combination of pre-tensioned and post-tensioned elements. Such a combination has all the advantages of a post-tensioned design plus the low cost of pre-tensioned strands for approximately one-half the prestressing force. Members of this type are economical up to maximum lengths and weights which can be transported.

One of the most important factors in the efficient design of Prestressed

Concrete is making full use of the tensioning element. High strength stress-relieved prestressed concrete wire is a top quality material made under carefully controlled conditions to produce a uniform dependable tensioning element. The Freyssinet Company, with 20 years' experience in Prestressed Concrete and hundreds of successful projects throughout the world, can be regarded as an authority on this type of design. For their post-tensioned structures they use an initial stress in the wires of 67% of the ultimate strength. The final stress is 85% of this or 57% of the ultimate strength of the wire.

A slightly higher initial stress, 70% of ultimate, is used for the tensioning elements in pre-tensioned bonded work because of the higher stress losses existing with this method. The final stress is 80% of the initial or 56% of the ultimate. At the present time the best pre-tensioning elements are 7-

Table 1 — 7-Wire Stress-Relieved Strands

Nominal Diameter Inches	Weight Per 1,000 Ft. Lb.	Approximate Area Sq. In.	Ultimate Strength Pounds	Design Load* Pounds	Tensioning Load Pounds
1/4	122	.0356	9,000	5,040	6,300
5/16	198	.0578	14,500	8,120	10,150
3/8	274	.0799	20,000	11,200	14,000

*This load is 56% of ultimate strength. "Criteria for Prestressed Concrete Bridges," recently published by the Bureau of Public Roads and now available from Supt. of Documents, U. S. Government Printing Office, Washington 25, D.C. for 15 cents per copy, permits up to 60% of ultimate for this load.



● Casting bed of J. Rich Steers, used to cast 4,500 pre-tensioned bonded deck members. Each member 30" wide by 12" deep by 21'6" long, prestressed with thirty 5/16" strands.

wire strands of the stress-relieved grade. The first strands used were 1/4 in. and 5/16 in. diameter. A series of severe tests have proved that 3/8 in. diameter stranded bonds satisfactorily, and in general it is now used in preference to the smaller sizes because of its greater "in place" economy. Its use is specifically approved by the new Bureau of Public Roads Criteria. Test programs on 7/16 and 1/2 in. diameter strand are now under way, and it is the writer's opinion that the 7/16 in. and possibly both will soon be proven satisfactory for general use. Non-stress-relieved strands are not recommended, because they are subject to wire breaks, at points where the wires have been welded, when the 70% initial tension is approached. Wires are not recommended, because large wires do not

develop satisfactory bond and a large number of small wires require a great deal of labor for placing and tensioning.

The above stresses were used in obtaining the costs per foot-kip unit mentioned earlier in this report.

Summary

If prestressed concrete is to take its place as a standard building material along with reinforced concrete and structural steel, the following factors must be kept in mind:

1—Full use should be made of the properties of the prestressing elements.

2—The proper type or combination of prestressing elements should be used.

3—Designers should become familiar with prestressed concrete costs

Table 2

Length of Member	Cost per Foot-Kip Unit
40'	1.53¢
70'	1.28¢
100'	1.15¢
150'	1.05¢

and specify prestressed concrete without alternates where it is the most economical material. There is, however, one advantage to offering alternates. A study of numerous recent bids where prestressed concrete was offered as an alternate shows that quotations on other materials were considerably lower than on jobs without alternates.

4—Several consulting engineering firms in this country now have considerable experience in the design and operation of casting beds. The fabricator who is planning to build a casting bed will probably save money and time by retaining such a consultant to design a casting bed for him.

5—All the post-tensioned costs in this report are based on grouted tensioning elements because that is what the vast majority of designers are specifying at present. It has always been the writer's statement that post-tensioned members can be economically and safely designed using unbonded galvanized strands, plus a few rail steel bars. This is borne out by the results of test programs — entirely independent of each other — recently completed at Lehigh University, and at Massachusetts Institute of Technology. It is also borne out by the successful completion and operation of about 30 structures, 17 in the United States, 4 in Cuba and 11 in El Salvador. These include bridges of 20 to 295 ft. spans and the heaviest prestressed concrete building girders in the western hemisphere. The first of the bridges — the Rio Paz in El Salvador — was opened to traffic in July, 1949. One of these is the Cuyaguateje in Cuba.

● The planning department of the Kansas Highway Commission is drawing base maps for the more populous counties of the state with an eye for the future. They are on aluminum sheets, with the culture applied with a stick-up material that can be easily removed and replaced.

This is done with the realization that, every five years or so, sufficient changes have taken place to make the detailed maps necessary for highway planning obsolete. This type of base map is easily kept up-to-date.



● Cuyaguateje River bridge in Cuba.

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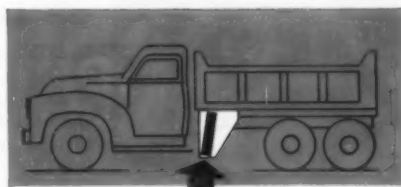
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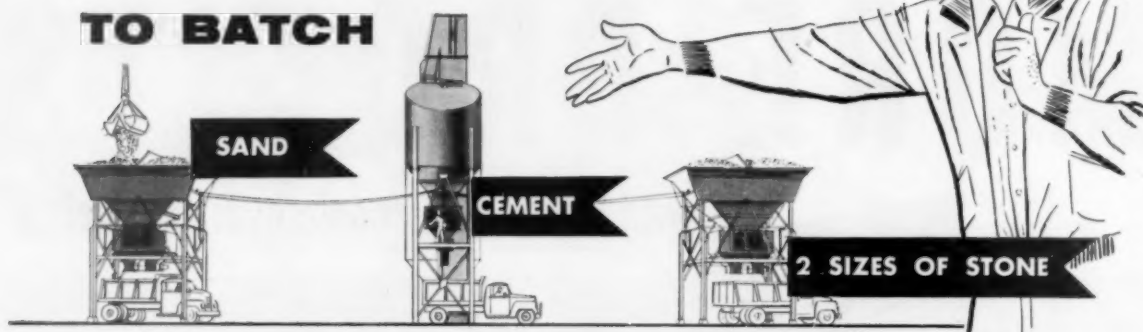
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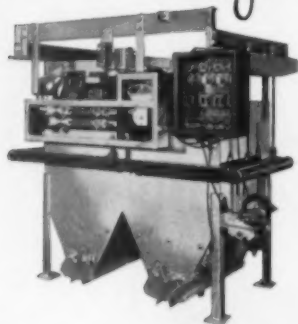
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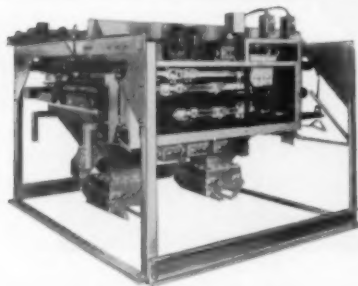


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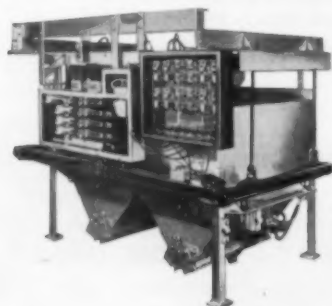
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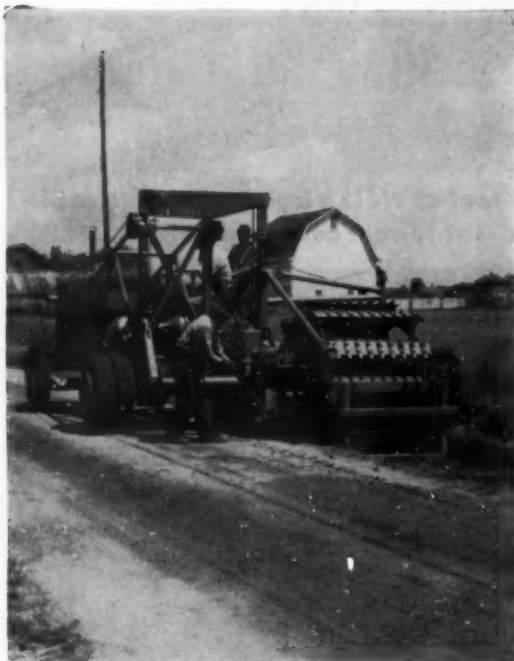
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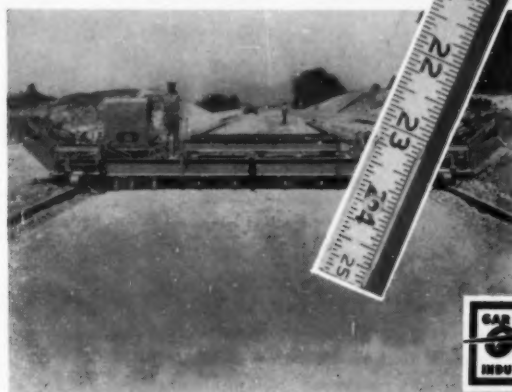
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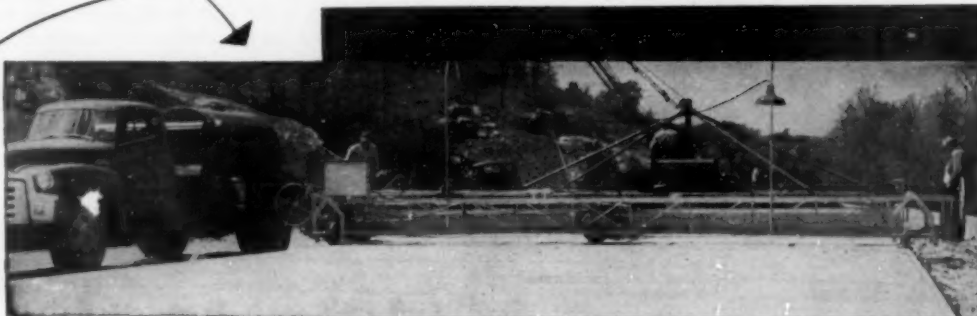
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1,000,000 feet of West Virginia turnpike cut in record time—at lowest cost in history!



In cooperative effort with William F. Middlestadt of Seals, Inc., of Baltimore, who furnished equipment and personnel, **CARDINAL NON-BRAK BLADES** cut a 68 mile x 1½ inch longitudinal joint in this new two lane highway, and a 24 foot transverse joint every 18 feet . . . total—1,000,000 lineal feet through limestone aggregate. Job completed with **CARDINAL NON-BRAK BLADES** in record time at a record low cost.



Cardinal **NON-BRAK BLADES**

Lowest initial cost on the market—reinforced with steel and fiberglass for better cut and longer life.

Cardinal **DIAMOND BLADES**

33 1/3% more cut-ability than conventional blades—25% lower initial cost.

When you work with **CARDINAL**, you work with blade men who know the concrete cutting business . . . men who will frankly tell you when a rugged, low-cost **CARDINAL NON-BRAK BLADE** will do the job on green concrete, at less cost than a diamond blade . . . or, when a **CARDINAL DIAMOND BLADE** will give you the best deal, cost-wise, on aged concrete or other hard specifications. More footage per day . . . less cost per cut—that's the kind of guarantee that makes good sense. Call, write or wire, today!

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World's Largest Exclusive Manufacturer of
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. . . for more details circle 175, page 16

ROADS AND STREETS, July, 1955

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FAST, EASY LOADING—Ford Tractor and loader speed snow removal; salt and chemical handling; dirt, sand and gravel loading. Versatile, maneuverable, easy to operate.



BETTER BLADING—You can use a Ford Tractor and rear blade to shape crowns, level berms, mix aggregate, grade, backfill and ditch. Fast, easy hydraulic operation.



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LOWER TRENCHING COSTS—Ford Tractor with trencher saves time and labor on road and street construction, utility service connections, sewer and drainage systems.



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FORD MOTOR COMPANY
Birmingham, Michigan

Now, as never before, Ford Tractors meet the needs of governmental units.

First, because there are now a number of Ford Tractor models from which to choose. There are power sizes to fit a wider range of governmental requirements, low prices to fit almost every community budget.

Second, because Ford Tractors are adaptable to many different types of work. They can be equipped to handle a great variety of jobs, so they stay busy all year long.

It's this versatility that cities, townships and counties like best about Fords. But there's much more they like, too. Ford Tractor economy, speed, and ease of operation mean worthwhile savings in time, money and manpower.

See how you can stretch tax-dollars by handling dozens of your jobs with a low-cost Ford Tractor. Call your nearby Ford Tractor and Equipment Dealer and get the facts first-hand.

... for more details circle 191, page 16

ROADS AND STREETS, July, 1955

DIGEST of Current Engineering Literature

By JOHN C. BLACK, Associate Editor

Statistical study of concrete tests

To insure specified strength — say 3,000 psi — concrete must be “over-designed” to a point where no batch or portion will fall below the required limit.

The study here described was on truck-mixed concrete with laboratory-mixed control. A total of some 2,000 cylinders were tested. Statistical analysis of the results indicates that strength tests of concrete conform quite closely to the normal probability law. Other tests are cited in confirmation. Practical conclusions in the present case are that an average specimen strength 15% higher than specification requirement is necessary, and that more than that is wasteful.

National Ready Mixed Concrete Association conducted the work at the University of Maryland in cooperation with Truck Mixer Manufacturers Bureau.

Coefficients of variation for “workable (structural) concrete” were 10.4% at 7 days and 9.5% at 28 days. “For reasons not readily apparent,” they were about 1.5 percentage points less for “harsh (pavement or mass) concrete.” “If we assume that, under field conditions, the coefficient of variation can reasonably be held to 10%, we have a basis for determining the amount of overdesign required to meet typical strength specifications.” It is on this basis that the 15% excess of average test strength over specified strength is calculated. It will insure 9 out of 10 tests exceeding specified strength; but to insure 99 out of 100, an excess of 30% would be necessary.

It is suggested that for a given operation, the prediction of strength variations might be more accurately expressed in pounds per square inch (standard deviation) than in percent. It is also noted that single cylinder tests can be used for some purposes but should not be made a basis for acceptance or rejection of concrete without special allowances.

The investigation was intended primarily as a study of within-batch variations as related to such factors as amount of mixing, rate of mixing, and size of batch. Eleven truck-mixers of different sizes and types were used. Mixing time, size of batch and method of batching were purposely varied so that conditions should be less favora-

ble than on ordinary commercial work. Cement was all of one brand.

Eighteen samples were taken from each field batch — six from the first, middle and last thirds respectively. Three samples from each third were tested at 7 days and three at 28 days. Great care was used to insure uniformity of test procedure. Mixes contained 5½ sacks of cement per cu. yd. and were made to a standard slump of 3 to 4 in.

“Studies of Uniformity of Comprehensive Strength Tests of Ready Mixed Concrete” by Delmar L. Bloem, Assistant Director of Engineering, National Ready Mixed Concrete Assn., ASTM BULLETIN, May 1955 American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa.

New weed killer on trial

Chlorophenyl dimethylurea, otherwise “Telvar W”, was used by the State of California as a roadside weed killer in the San Francisco Bay area in the season of 1954.

Outstanding advantages over the previously employed sodium chlorate (alone or mixed with other chemicals) and the still older method of oil spraying and burning include freedom from fire hazard, freedom from harmful effects on personnel, and the fact that less ground preparation is needed before application. One caution is noted: there may be danger to certain trees and shrubs adjoining the treated strip. Further experience and observation will tell.

The mixing proportion is 13 lb. of Telvar W to 50 gal. of water. Normal treatment requires about 50 gal. of solution per roadside mile 4 ft. wide, against 350 gal. for sodium chlorate. Practical truck speeds are about 10 miles per hour in the one case and from 3 to 5 miles in the other. A spraying pressure of 40 psi is used; higher pressures produce fogging and wind drifting. A disadvantage in the new product is the fact that it is only slightly soluble in water, and must be maintained in suspension by continuous agitation in the tank while being used. Total cost of treatment appears about the same as for sodium chlorate.

Best time for application is before

expected light rains, but not when heavy rain is due. Telvar W acts as a soil sterilant. Its carry-over effect from one year to the next has not been definitely determined, but is believed better than that of sodium chlorate.

“California’s Roadside Vegetation Killed with Chemicals” by R. D. Kinsey, Assistant District Engineer and S. Evans, District Landscape Engineer, California Division of Highways, San Francisco, Calif., CIVIL ENGINEERING, 33 W. 39th St., New York 18, N.Y., March, 1955.

Seattle harbor’s significant pile record

Diver inspection of 425 piles of Port of Seattle’s Pier 25, driven in 1914 showed only 12 (3% of total) damaged sufficiently by limnoria or bankia to warrant replacement after forty years of service. Puget Sound waters are classed as “borer-infested”.

Inadequate tap protection had lead to decay in the top 24 in. of some piles, but below that point these piles were sound. All piles had received a full cell treatment of 12 lb. of creosote per cu. ft.

Inspections of seven other piers aged 23 to 33 years showed from 75.7% to 97.5% of all piles good. Borer infestation varies between areas in the harbor.

Says C. K. Clausen, Port of Seattle structural engineer, “On the basis of service records it is reasonable to assume at least 75 per cent of pressure treated creosoted piles in Seattle Harbor are found good and perfect after 30 years of service. That is to say, 75 per cent of the original piles are capable of supporting the full load which they were designed to carry and to all intents and purposes are as good as new piling as far as use of the structure is concerned.”

In the planned replacement of the East Waterway central wharf, the port will re-drive approximately 300 salvaged piles which have been in service since 1918 and which still are good. These are 70 to 75 ft. piling, given the 12 lb. full cell treatment in 1914.

Pile top protection was improved greatly in 1953. “Prior to that it consisted simply of a sheet of roofing felt.

Complete 1 job, start another 5 miles away in 1 day with Tournatractor



▲ Traveling at speeds to 19 mph, Tournatractor tows fuel wagon over regular highways from one job to another. "We have to get around fast in this part of the country," Edwin Anderson comments. "With Tournatractor it's easy to get from job to job."

On this ditching job, Tournatractor pulls an elevating grader along the side of the road. Grader casts earth from the ditch to the road in order to raise grade level 2 feet. In just 15 minutes, about 160 yards of earth were moved by this method.



When officials of Grant County, South Dakota, decided to replace their Tournatractor after 4 years of dependable service, they bought another of these LeTourneau-Westinghouse machines.

This handy high-speed maintenance tool handles a variety of side-sloping, leveling, grading, dozing, and hauling assignments for the county highway department. Equipped with snow plow blade, it clears roads in winter. Pulling an elevating loader, it has helped rebuild many roads.

"Tournatractor has done just about everything on our construction work," is the way Operator Edwin Anderson puts it.

Slopes, grades, sets culvert

Take a typical job . . . installing a culvert to replace a small bridge. Building up the roadbed, sloping shoulders, and setting of 5' sections of culvert, weighing 6 tons each, Tournatractor completed entire job in 9 hours. Then, it "ran" to another job 5 miles away in about 15 minutes.

Quick moves on scattered assignments

This fast job-to-job travel is important when rush jobs are scattered over 300 miles of county roads. Hauling costs and loading delays are eliminated. Big rubber tires roll over pavement, curbing, or tracks without damage. No job is very far away at 19 mph travel speed. Usually, Tournatractor tows its own fuel wagon, eliminating truck and driver.

Ask for more information

You've probably read quite a few job reports showing Tournatractor efficiency on large projects as well as small-yardage construction and maintenance jobs. Isn't it time you checked what fast speeds on rubber tires, plus 208 hp, could do to simplify your work? Call or write us for details. We will be glad to arrange a demonstration.

Tournatractor—Trademark T-585-P-b

LeTourneau-Westinghouse Company

PEORIA, ILLINOIS

A Subsidiary of Westinghouse Air Brake Company

... for more details circle 262, page 16



The protection method now used is as follows: Top is painted with two coats of hot creosote and then is covered with three layers of coal tar pitch saturated fabric, mopped on with four coats of hot coal tar pitch and nailed to the pile with galvanized nails. Drift bolt holes are filled $\frac{1}{2}$ in. with mastic."

"Outstanding Service Life Given by Treated Piling on Seattle Waterfront" by Gordon M. Quarnstrom, WOOD PRESERVING NEWS, 111 W. Washington St., Chicago 2 Ill., February, 1955.

Roman reference

Ancient Roman roads — their efficient locations and remarkable construction — still fascinate historically minded engineers. Probably they always will. They make good conversation, give us pride of professional ancestry, and perhaps a touch of needed humility in achievement. The following excerpt recalls a few details.

* * *

"The Romans had very high standards of road construction. Their standard pavement construction varied from $3\frac{1}{2}$ to 4 ft. in thickness, consisting of four main layers. They usually laid their base course on a properly compacted layer of sand called the *pavimentum*. The base course consisted of the lower *statumen*, except when roads were built on solid rock over which was placed the *rudus*, usually of concrete or of compacted clay. Upon this they laid their third layer, or *nucleus*, which was usually of sand or gravel put down in successive layers and rolled. Upon this was then laid the *summa crusta*, which formed the wearing surface of the road or pavement as we know it today. Many thousands of miles of road constructed in this way are in use today, modern highway pavements in many cases resting upon the old Roman foundations."

"Soils and Materials for the Highways of Tomorrow" by Robert F. Legget, Director, Building Research Division, National Research Council, Canada, ROADS AND ENGINEERING CONSTRUCTION, 341 Church St., Toronto 2, Ontario, December, 1954.

Highway tunnel lighting

Brief descriptions of lighting systems in use in six tunnels — four in Europe and two in South America — are given, attention being directed chiefly to the type, size and location of the lighting units.

"Two questions of importance are the color of the light and, in view of

Land Acquisition and Control of Access

(See Review, page 99)

"During 1953, the committee continued its efforts to bring about a better realization of the benefits to be derived from efficient methods of acquiring land for highway purposes, adequate control of the roadside, including methods possible under eminent domain and the general police power, and up-to-date ways of providing effective provision of parking accommodations."

This 39-page report contains discussions and legal references under the divisions and sub-heads noted below. Other articles in the 82-page bulletin are: "Bringing Zoning up to the Automobile Era," "Protection of Highways and Feeder Streets through Subdivision Control," "Zoning Approach to the Chicago Parking Problem," "Controlling the Use of Access."

Land Acquisition

- Reservation of Highway Right-of-Way Prior to Acquisition
- Acquisition of Highway Right-of-Way for Future Use
- Immediate Possession of Highway Right-of-Way
- Nature of Interest Taken
- Relocation of Highways
- Severance Damages
- Financing Right-of-Way
- Condemnation Procedures
- Compensation for Damages Resulting from Highway Improvements
- Right-of-Way Costs and Land Value

Control of Highway Access

- Authority to Establish Controlled-Access Highways

- Access Rights on New Highways
- Access Rights on Existing Highways
- Authority to Barricade Streets
- Land Acquisition for Expressways
- Use of Access Openings
- Economic Impact of Expressways

Control of the Roadside

- Subdivision Control
- Zoning
- Highway Setbacks
- Right-of-Way Encroachments
- Zoning Ordinances Prohibiting Billboards
- Billboard Control for Aesthetic Purposes

Parking

- Provision of Off-Street Parking Facilities as Public Purpose
- Financing of Municipal Parking Facilities
- Leasing Space in Parking Facilities for Nonparking Use
- Other Parking Ordinances
- Parking Facilities through Zoning

Information Interchange

- Analysis of Parking Requirements in Zoning Ordinances
- "Report of Committee on Land Acquisition and Control of Highway Access and Adjacent Areas" by David R. Levin, Chairman, Chief, Land Studies Section, Financial and Administrative Research Branch Bureau of Public Roads, HIGHWAY RESEARCH BOARD BULLETIN 101, "Trends in Land Acquisition," Highway Research Board, 2101 Constitution Ave., Washington 25, D.C. — 1955.

the long operating hours, the economy of these installations. The color white, or "daylight," as applied in the Croix-Rousse and the Blackwall Tunnels, is of course always a suitable one, and this makes the fluorescent tubular lamp the best light source for this purpose.

"For tunnels principally used by fast traffic, as those in Rotterdam, Antwerp and Sao Paulo, as illustrated here, the use of sodium lamps offers two distinct advantages:

- (1) by sodium light, a very favorable visual perception is obtainable, and
- (2) sodium lamps have a high luminous flux (60 lm./w.), which means a lower current consumption than can be obtained with either incandescent lamps (20 lm./w.) or with fluorescent tubular lamps (40 lm./w.).

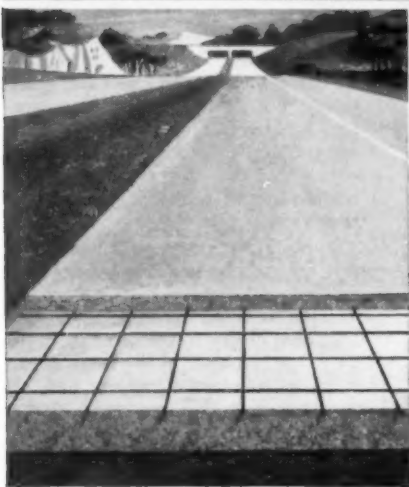
"No matter what light source is employed, the methods of lighting appear to be practically identical.

"The various attitudes towards the light color of the lamps and the economy of operation, involve arguments which must be considered individually."

Tunnels considered are the Croix-Rousse in Lyons, France; the Nove de Julho, Sao Paulo, Brazil; the Via Anchieta, between Sao Paulo and Santos; the Blackwall, London; the Schelde, Antwerp; and the Maas, Rotterdam. There are nine illustrations of the lightings in service.

"Tunnel Lighting," CONTRACTORS RECORD AND MUNICIPAL ENGINEERING, Lenox House, Norfolk St., London, W. C. 2, England, December 29, 1954. (Credit is given to INTERNATIONAL LIGHTING REVIEW.)

50 MILLION VEHICLES A YEAR can't pound New York State Thruway apart



LIKE A 3-LAYER CAKE—

that's how the concrete pavement for the New York State Thruway is built up. First to go down is a foot-thick base layer of gravel. Six inches of concrete is then poured over the gravel. 11' 6" x 15' sheets of American Welded Wire Fabric come next to tie the slab tightly together, add strength, and reduce cracking. A final layer of concrete, 3" thick, finishes the job.

In the next six months 24 million vehicles will rumble over the longest super highway of them all—the New York State Thruway. Traffic experts expect this new 426-mile, divided highway to carry 50 million vehicles in 1956, and they expect that staggering figure to show a marked increase in the future.

Obviously this road needs extra strength—and it gets it from a tough backbone of American Welded Wire Fabric Reinforcement. For equal slab thickness of concrete the use of American Fabric increases the strength of a concrete pavement

slab about 30%. It insures less cracking and longer life.

American Welded Fabric adds strength and life to the Pennsylvania Turnpike, the Indiana Turnpike, the Kentucky Turnpike, the Ohio Turnpike, the Chicago Expressway, and countless secondary roads and city streets. Specify it for all your paving—both cement and asphaltic concrete. American Welded Wire Fabric is now available in wide sheets for continuously reinforced concrete pavements in wire sizes up to and including 1/2" in diameter at 2", 3", 4" and 6" on centers.

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EVERY TYPE OF REINFORCED CONCRETE CONSTRUCTION NEEDS

USS AMERICAN WELDED WIRE FABRIC

UNITED STATES STEEL

... for more details circle 167, page 16

ROADS AND STREETS, July, 1955



Terrestrial Magnetism, Its Cause and Cyclic Effects

By Halbert P. Gillette

THE Earth, the Sun and many stars are known to be magnetic, but the cause has been problematical. A recent issue of *Encyclopedia Britannica* says: "No satisfactory explanation of the earth's field has ever been offered." When Prof. F. H. Bigelow announced in 1886 that the sun's coronal streamers indicate that the sun is a magnet, his theory was ridiculed because it was supposed that very high temperature made magnetism impossible. But in 1913 George E. Hale proved by spectroscopic observations that the sun is a magnet. Four years later he located its magnetic poles, and soon thereafter found that sunspots are rotating magnets.

In the December 1954 issue of *ROADS AND STREETS* the writer pointed out that when the Earth and other planets are near heliocentric (sun-centered) longitude 290 degrees, they tend to cause sunspots and many terrestrial anomalies, such as storminess and quakiness.

Previous Knowledge

It has long been known that the longitude of the sun's orbit is about 290 degrees. From this the writer infers that the sun's great velocity through celestial electrons induces magnetism of the sun and charges it with electrons that escape in streams and cause cyclic effects on the Earth.

Since the Earth is carried along by the sun at great velocity, and has an even greater orbital velocity of its own, it should acquire magnetism in the same manner as the sun does. Moreover it should develop whirls in its atmosphere corresponding to sunspots, and it does.

Although high temperature was discovered not to be inimical to solar magnetism, the Earth's molten core is still regarded as non-magnetic. Seven years ago the writer suggested that great pressure may largely offset the effect of high temperature on magnetic susceptibility. It was pointed out that Prof. P. W. Bridgman had produced hydrostatic pressure of 6 million pounds to the square inch, equiv-

alent to that at a depth of 1,000 miles below the Earth's surface. Such pressure in the steel pipe greatly increased its tensile strength. This had not been anticipated. Even more astonishing was the effect on chemicals subject to this pressure, for molecular combinations occurred that were not produced under ordinary pressure.

Prout's Theory

In 1815 William Prout, a London physician, announced that because many atoms had atomic weights that were nearly integral multiples of that of hydrogen, he inferred that all atoms are compounds of hydrogen. His theory met with scant consideration because some atoms (e.g. chlorine) had weights that differed considerably from integral multiples of hydrogen's weight. Had there been less skepticism and more experimentation the hydrogen bomb might have been developed half a century ago.

The force that causes hydrogen atoms to unite to form grosser atoms is declared by scientists to be one of the deepest mysteries. But if we conceive that the two least massive corpuscles, the electron and the positron, form an orbital pair we may find that Prout's theory involves no greater mystery than magnetism itself.

Call such an orbital pair of electrified corpuscles a magneton. Assign to them the velocity of light, and assume that hydrogen consists entirely of magnetons. Then all matter has internal energy equivalent to half its mass multiplied by the square of the velocity of light. This is just half the energy of Einstein's famous formula, but the two theories differ radically. Einstein assumes that mass is convertible into energy, which is inconceivable; whereas the magneton theory involves no such conversion, but merely the disintegration of some of the magnetons when hydrogen atoms unite. The writer conceives that the force that causes them to unite is the magnetism of the orbitally paired electrons and positrons.

When a cosmic positron vanishes it

is supposed to be converted into energy. But the magneton theory explains its disappearance as due to orbital union with the ubiquitous electron.

This evolution of the magneton theory led to the inference that electrons may pervade the cosmos because the wave-carrying ether itself may contain magnetons. Several phenomena tend to support this theory.

The transversity of radiant waves in the ether has been so puzzling that this and other facts have led nearly all living scientists to reject the ether theory. But if ether consists of magnetons such as compose all atoms, they are presumably susceptible of coherence where and when magnetons have components of orbital motion in the same direction.

Turning to magnetic phenomena that are more easily investigated, the writer found that the Earth's diameter changes in cyclic fashion. For a very long time before the close of the Tertiary Age the level of the sea was increasing, whereas since the end of that Age and the beginning of the Quaternary the sea level has decreased enormously. This epoch of increasing elevation of the earth's surface is strikingly shown in southern California by a series of wave-cut terraces, the highest of which is about 1,300 feet above mean sea level on Point Firmin in San Pedro, and 1,700 feet on Catalina Island some 30 miles away. There are occasional gaps in the series caused by erosions, but a vertical spacing of about 85 feet has been reported by several geologists.

Terrace Series

Where the Methow joins Columbia River there is a series of 16 terraces, the highest of which is 1,200 feet above the river and about 1,800 feet above sea level. The writer regards these as cut by waves when the Columbia Valley was under sea water.

On the west coast of Greenland the highest of several marine terraces is at an elevation of 1,800 feet. There



● Basaltic beds 90 ft. thick, recording the 18,000-year cycle.

is additional evidence of wave cutting up to this elevation in other widely separated regions.

Terraces at 85 or 90 feet intervals indicate that relatively short halts in decreasing sea level were caused by a cycle. What was its length and how did it operate?

Since the average thickness of rock varves (annual laminae) in many different regions is about the same, 150 to 250 varves to the foot, this terrace cycle has a length of the order of 18,000 years.

There is excellent geological evidence in varved rock strata of a series of cycles, each three times as long as the next shorter one. The article above cited discusses the shortest climatic cycle of this series and shows that its length is 672 years between maxima of rainfall. Since approximate commensurability of lengths occurs in many regions, probably exact harmony accounts for it.

Nineteen of the 18,000-year cycles are recorded by the Catalina Island terraces above cited. Hence the Quaternary Age began about 350,000 years ago.

Three main terraces exist around Great Salt Lake, the highest about 1,000 feet above the lake. The writer regards these as having recorded three Quaternary Ice Ages whose cyclic intervals between maxima are 9 times the 18,000-year cycle, or about 162,000 years. The last Ice Age peak was about 20,500 years ago. The writer has dated lake varves (annual laminae) of the last Ice Age by finding many cycles in them of the same lengths as cycles found in varves of Lake Saki, Crimea, and in the rings of California's "big-trees." Thus the 20,500 B.C. dating of the last Ice Age peak has been found by direct evidence.

The accompanying photograph shows several basalt beds on the Columbia River, near Rock Island, Washington. The major beds are about 90 feet thick, and often show minor beds 30 feet thick — again the 3 to 1 or triplex ratio which is also common in stratified rocks.

In this case of basalt beds, there are, near-by, deep pot holes whence the molten rock flowed in vast streams that formed lakes where it hardened. This was during the Tertiary Age when the Earth's crust was shrinking in diameter, yet when the Earth was abnormally hot as indicated by great outflows of basalt.

Since heat expands solid rock, how could the crust's diameter have been decreasing at that time? The answer puzzled the writer until it was remembered that when crystalline rocks are fused the density is considerably less than when solid. Consequently when the molten core cools and solidifies, it crystallizes and expands. Conversely when crystalline rock adjoining the core fuses its density decreases, causing decrease in the diameter of the Earth.

Seismologists have discovered that a terrestrial molten core exists and has a diameter of about 3,600 miles, as compared with the Earth's 8,000. This discovery was based on the fact that transverse waves do not pass through a fluid. Thus by studying transverse waves caused by earthquakes, it was found that none passed through a molten core 3,640 miles in diameter.

The next important question is why climatic cycles are correlated with cycles of temperature variation of both the molten core and the rocks above it. To this question the writer's answer is that both kinds of cycles are caused by cyclic bombardment of the Earth by streams of solar electrons. These

affect the weather in several ways: (1) By increasing the evaporation of oceans; (2) by serving as nuclei for the condensation of atmospheric moisture; (3) by causing more and greater cyclonic and anticyclonic air-whirls; (4) by causing winds between such pairs of whirls; (5) by causing west-erlies, including "jet streams" at high levels; and in other ways that will be described in a later article.

Increase in the same cyclic stream of solar electrons causes induction of magnetism in the Earth, causing pressure that generates heat.

These induced magnetic forces cause increases in the oblateness of the molten core, which results in reduced speed of axial rotation or "spin" of the Earth. The writer has correlated several weather cycles with recorded dates of reduced axial "spin," notably one outstanding case near the 1658 A.D. wet-cold peak of the Alpha cycle of 672 years, which is discussed in the article above cited. There it is ascribed to a giant planet, Alpha, whose heliocentric longitude is now about 88 degrees.

1938 Occurrence

Another outstanding instance of reduced spin occurred in 1938. This was when three harmonic cycles of solar electron streams had coincident peaks. The longest of these is 56 years, or one-twelfth of Alpha's orbital period, and the shortest is 11.2 years, both of which are discussed in the article above cited. The third cycle has a length of one-third of 56 or 18½ years. At least 20 researchers have published evidence of weather cycles differing less than 2% from 18½ years; and a larger number have found a weather cycle of about 11.2 years and one of double that length.

Returning to the significance of marine terraces, those on our Atlantic coast, although less conspicuous than in southern California, are more informative as to shorter cycles. On Anticosti Island in the Gulf of St. Lawrence there is a remarkable series of terraces a mile wide and 30 feet apart vertically. They are cut in solid rock, hence their intervals have been quite accurately determined. Between many of the lower terraces there are others, 10 feet apart — again the triplex ratio of cycle lengths. The highest terrace is 442 feet above the mean sea level, not much below the top of the island.

The writer infers that the 30 ft. terraces record the Gamma cycle of about 6,000 years, and that the 10 ft. terraces record the Beta cycle of about 2,000 years. The Alpha cycle of 672 years was not recorded, probably because of variations in tidal levels of wave action.

On Lake Erie, near Ashtabula, seven terraces about 28 ft. apart, up to an elevation of 870 ft. above the sea, are supposed to have been cut by lake waves before erosion had lowered the lake. But these 28 ft. intervals are too nearly those at Anticosti Island to be accidental, and probably are also of marine origin.

On both sides of the Atlantic there are many outstanding terraces 20 to 25 feet above sea level, indicating a general rise of the Earth's crust at a uniform rate in geologically recent times. The writer estimates that these low beaches were wave-cut about 2400 B.C. near the last peak of the Delta cycle of about 18,000 years. That this cycle had other striking effects about 2400 B.C., is shown by several facts, notably:

(1) Lake Saki (Crimea) varves were thickest about then.

(2) The floods of the Nile, as scribed in the rock walls of the Second Cataract, were about then the highest ever recorded.

(3) Land-locked Owens Lake, California, overflowed about then, as shown by the length of time for the Owens River to deliver to the lake the chlorine it contains.

(4) The second and last Egyptian Pyramid Building Area occurred about then, probably because of abnormal prosperity due to heavy rainfall that the Nile delivered to the Valley of the Pharaohs.

The preceding wet-cold extreme of the Delta cycle coincided with the last peak of the Ice Age cycle about 20,500 B.C.; and its next dry-warm extreme will occur about 6700 A.D.

A dry-warm extreme of the 672-year cycle will be caused by the giant planet Alpha in 1994.

Addenda

An article in the June issue of *SCIENCE DIGEST* on Flying the Jet Stream states that these strong high altitude winds from the west occur in both hemispheres about 2000 miles from the Equator. Their cause has been very puzzling. But the writer's theory of a magnetic molten core in the Earth may provide an answer. Streams of solar electrons are known to be attracted by the Earth's north magnetic pole. Let similar streams be attracted by the poles of a magnetic molten core near midlatitudes and they would tend to impart great velocity to the air where its density is low. The strength of the jet streams in the northern hemisphere is greatest between March and July when the sun's rays are propelling more of its electrons earthward.

Radar reflections will disclose a jet

stream and its elevation if it is propelled by solar electrons. If this occurs it may revolutionize meteorology.

In middle latitudes of the southern hemisphere the westerly wind over the ocean is often so strong that sailors speak of that region as "the roaring forties". The cause above assigned for the high altitude jet streams in that region probably explains these winds also. The writer believes that many winds have an electronic cause, e.g. those between pairs of "lows" and "highs" which are cyclonic and anticyclonic whirls. Sunspots are known to be magnetic and whirling, as discovered by the late George Hale of Mt. Wilson observatory, who also found that the sun is a magnet. Applying one of Faraday's principles, the writer inferred that sunspots illustrate on a grand scale what Faraday had effected on a tiny scale in his laboratory.

Every large planet may have a magnetic molten core and possibly the sun is similarly constructed. Its 11.2 and 22.4-year sunspot cycles point that way.

The most tornadic region in the world is centered in Kansas, for which there has been no satisfactory reason. Kansas City is close to the meridian of the north magnetic pole, and its latitude corresponds with that of "the roaring forties" of the southern hemisphere. Hence it is probable that the magnetic field of the north magnetic pole causes these violent whirls by its action on electrons escaping from the Earth's surface in this region. Certainly winds moving with such devastating velocity are not due to eddies between the relatively mild winds that precede a tornado.

May is the month that on the average has maximum frequency of these deadly funnels. They do not occur when the ground is frozen nor after it becomes dry, because it is then a poor conductor of electrons that come from the sun, impelled by its radiant waves. Spring and autumn are periods of abnormal auroras caused by solar electrons, and, very significantly, spring and early summer are most tornadic, whereas autumn is the hurricane season. The latter are probably caused by solar electrons escaping from the ocean into which they had been recently fed by anticyclonic whirls from ionospheres of our upper atmosphere.

Although this article is not primarily on ether, light is an electromagnetic phenomenon as shown by Maxwell, and this article relates to magnetism. The writer conceives that both matter and ether contain magnetons that interact, and that the ether, at least to that extent, is itself

matter. It also consists of corpuscles that may be called etherites. They are assumed to resemble molecules of gas, but move to and fro with the velocity of light.

The etherites exist between the electrical corpuscles of the magnetons in matter as well as in ether, and their density is variable, depending on the relative motions of magnetons. The etherites are assigned no forces of attraction or repulsion, and their energy is entirely kinetic.

The magnetons in matter and in ether, by virtue of their magnetic and electric forces, constitute a universal elastic system that is subject to temporary breaches, and to the disruption of some of the magnetons. Such disruptions release their constituent pairs of orbital corpuscles which fly off tangentially in opposite directions with the velocity of light. Thereupon their impacts with etherites cause closer packing, followed by reactive separation, generating expanding waves.

Expanding Waves

These waves impinging upon ether magnetons orient them so that their orbital planes became perpendicular to the advancing etherite waves. When thus oriented toward parallelism their magnetic attraction increases, and they approach one another. But if the orbits of their corpuscles are elliptical, as in all observed orbits, it follows that the orbital velocity of each pair goes through a cycle each revolution, being greatest when nearest to one another and least when farthest apart. This results in a cyclic change of their magnetic force for it varies with their velocity. Two parallel magnetons will tend to have their electrons in the same longitude because of their mutual magnetic attraction. But as they approach one another their electric repulsion will increase until it balances their magnetic attraction. The same applies to the positrons 180 degrees away.

This, the writer believes, is the electromagnetic mechanism that causes the transverse waves of light discovered, to their own astonishment, by Fresnel and Arago in 1821.

That the ether could have waves transverse to the direction of rays of light seemed so nearly incredible that they were very slow in publishing the evidence of it. But perhaps more astonishing was Max Planck's announcement in 1900 that light waves and all other kinds of radiant waves transmit energy in packets or quanta as if they were corpuscles. The energy of each quantum is $h\nu$, in which h is a con-

stant and n is the wave frequency. The writer's interpretation of this mysterious though simple law is this: Planck's constant h is the energy of each pulsation of a magneton during an orbital revolution. The frequency per second of the waves, depends on the number of magnetons acting in a cohering magnetonic system.

It has been supposed by Einstein that the great energy of an atomic bomb results from conversion of some of its mass into energy. The theory here presented calls for no such inconceivable process, but merely for disintegration of some of the constituent magnetons of matter in the bomb. Since the orbital velocity of the paired electrical corpuscles of a magneton is that of light, their energy is devastating when they fly asunder in large numbers. It is their great magnetic attraction when moving at that velocity that accounts for the fact that atoms of hydrogen composed of magnetons unite to form grosser atoms when a hydrogen bomb explodes.

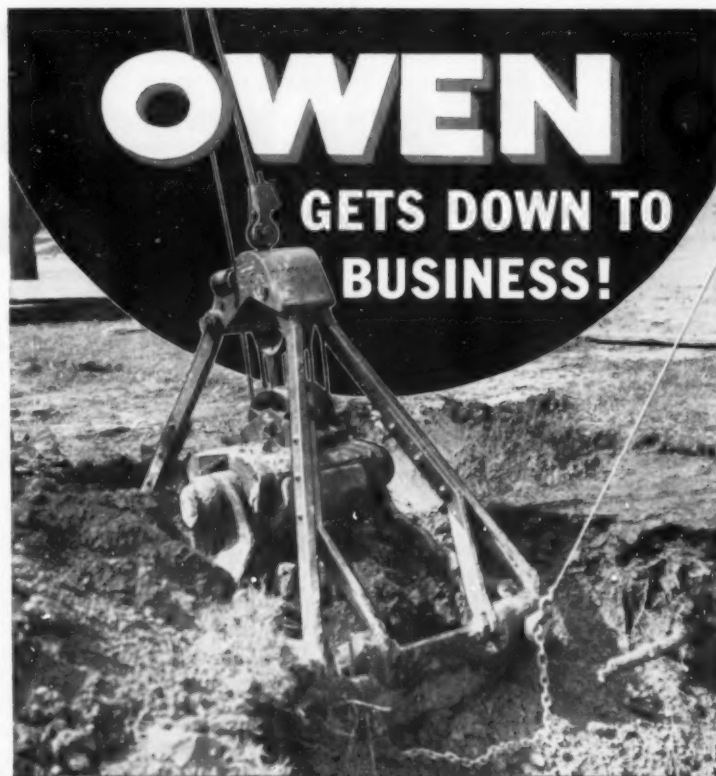
Farm Wife Doesn't Want Road Improved

Hundreds of letters are received by the Pennsylvania Department of Highways, and many of them request or demand improved highways. But once in a while someone seems well satisfied with old style roads. For example, the following letter from a farm wife in Bucks County:

"We live on a farm which has a county road which so far has been safe for our children to cross. Now we hear they are going to macadamize it. It will be a death trap for our children for it has a hill and a driver can not see what is below, and it could be a child. We almost live on the road and now the way the road is they still come down at 50 miles an hour and if it was macadamized would just be impossible for them to stop in time. Why not leave the road the way it is and let our children be safe. If it is true that they are going to do it could we vote against it. They sure don't need to make this road of ours a speed way because the highway is only 1 mile from our little farm.

"It is off of 322 horseshoe Pk., Downingtown, Pa. 2 miles N. of Downingtown often called Prime Road or Fisherville Rd. Please let me know what to do if they are going to macadamize for we have four families up here against it and two for it."

Secretary Lawler instructed the district engineer to make a survey and to report on the situation.



OWEN

GETS DOWN TO BUSINESS!

...down into capacity loads at rapid digging speeds

Owen buckets get "down to business" because they are designed and built for just that purpose. Low center of gravity...teeth made and positioned for deeper penetration...more rugged lip, shell and arm construction...full balanced digging power on each jaw of bowl...all these Owen features assure a maximum load at every bite.

Write today or ask your dealer for the latest Owen bucket catalog giving full details on all sizes and models.



"A mouthful at every bite"



THE OWEN BUCKET CO.

6070 Breakwater Avenue • Cleveland 2, Ohio

Branches: New York, Philadelphia, Chicago, Berkeley, Calif., Fort Lauderdale, Fla.

***“Four reasons why the is the hottest thing in road equipment today*”**



IT'S MOST VERSATILE!

The Flex-Plane will do everything. It converts to its own trailer by the flick of a finger. It widens — hydraulically — to suit various slab contours without leaving the forms. Its extra width range enables it to take the place of two standard finishers. It takes and holds a crown easily and accurately. In fact, whatever your operations call for, you'll find the answers in the Flex-Plane.



IT'S RUGGED—DEPENDABLE!

The Flex-Plane is sturdily constructed to give years of trouble-free service. Although it will widen beyond the maximum of other finishers it features a “triple lap” frame that will permit this extra widening without sacrificing stability. Heavy duty, extra wide screeds are mounted outside the frame for better screeding, ease of any on the job screed altering, and permitting easier “shoveling-in” in front of screeds.



A pair of Flex-Plane Finishers at work on the eastern end of the Ohio Turnpike.

THE WORLD'S LARGEST MANUFACTURER OF CONCRETE

FLEX-PLANE Finisher

Two Flex-Plane Finishers at work on a section of the Ohio Turnpike south of Cleveland.



IT'S EXTRA FAST!

Husky enough for the toughest jobs the Flex-Plane has power to spare. A unique transmission converts this power to speed when moving back down the forms. Thus, the Flex-Plane can easily keep pace with the fastest spread even when making two or three passes. It has multiple speeds both forward and reverse, with selector on the control panel. Contractors who have used the Flex-Plane find they can actually make money on repair jobs. It's that good!



IT DOES MUCH MORE!

Every part of the Flex-Plane has been thoroughly engineered and job tested on hundreds of miles of roadway — both single and double width. It's a proved piece of equipment that will give you a better finish, faster, and at less cost than any other machine of its kind. Look it over. Let us show you one in operation near you. Talk with the owner or operator and we feel sure your next finisher will be a Flex-Plane — the fastest selling finisher on the market.



FINISHING MACHINES

... for more details circle 189, page 16

ROADS AND STREETS, July, 1955

THE FLEXIBLE ROAD JOINT MACHINE COMPANY

4200 THOMAS ROAD
WARREN, OHIO

I am interested in getting faster, better, more economical finishing. Please send me literature on the FLEX-PLANE Detroit Special.

NAME

COMPANY

ADDRESS

CITY STATE

Personals

STEWART MITCHELL, principle bridge engineer with the California Division of Highways, has retired after 31 years with the Division. Mr. Mitchell's work has included that of bridge maintenance engineer, bridge construction engineer, engineer of bridge planning and design, and engineer in charge of special investigations. He has held numerous professional honors including the past presidency of the Sacramento section of the American Society of Civil Engineers, and past national chairman, Structural Division Executive Committee of ASCE.



Stewart Mitchell



Edward M. Howard

EDWARD M. HOWARD, formerly district engineer for the Asphalt Institute at Boston and at Springfield, Ill., has been appointed field engineer for the Wire Reinforcement Institute, Washington, D. C. (located at Springfield, Ill.) Mr. Howard's work will be to coordinate Institute activities with state and city engineers who are constructing fabric-in-asphalt projects for pavement surfacing.

HOWARD S. CULLMAN has retired as chairman of the Port of New York Authority, agency in charge of tunnels, bridges and airfields in the New York metropolitan area. He is suc-

ceeded by DONALD V. LOWE. Mr. Cullman, a New York businessman, served as a member of the Authority for 28 years, as vice-chairman for nine of these years, chairman for ten. He has been named honorary chairman.

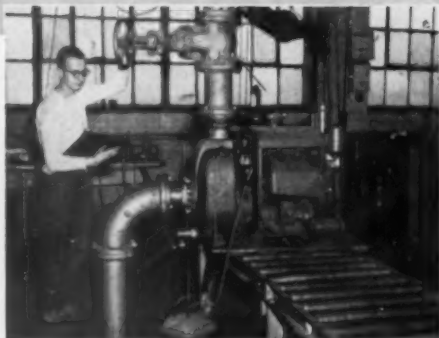
E. V. JOHN has been named Right of Way Engineer for the Iowa State Highway Commission, succeeding W. P. Nichols, who reached retirement age, but remains in an advisory capacity. Mr. John is a 30-year man with the commission; Nichols, 35 years.

COLONEL W. A. McWILLIAMS has retired as chief engineer of the Delaware State Highway Department, to accept a post as project engineer on



W. A. McWilliams

BARNES "33,000 for 1" PUMPS tested and proved—where it counts



BARNES SELF PRIMING CENTRIFUGAL

—the Pump that delivers 33,000 gallons of water for 1 gallon of gasoline

Tested in the factory—Every Barnes Pump is rigidly tested before it leaves the factory—tested for capacities at various heads—tested to insure that it measures up to Barnes performance requirements—33,000 gallons of water pumped for 1 gallon of gasoline!



Proved on the job—Proved on the tough jobs everywhere—proved in the field—proved by the exacting requirements of Contractors and on-the-job demands for ruggedness, dependability, long trouble-free life and economy of operation!

BARNES MANUFACTURING CO.

Mansfield, Ohio • Oakland 21, Cal.

Buy the Best . . . Buy Barnes





W. B. McKendrick, Jr.

the staff of the Nello L. Teer Company. He is succeeded by Walter B. McKendrick, Jr., formerly assistant chief engineer. Col. McWilliams's first assignment with the Teer company will be a U. S. Government project in Iceland.



- ALLEN D. McCOMBS, President of the John F. Casey Company of Pittsburgh, was elected President of the Constructors Association of Western Pennsylvania for 1955.



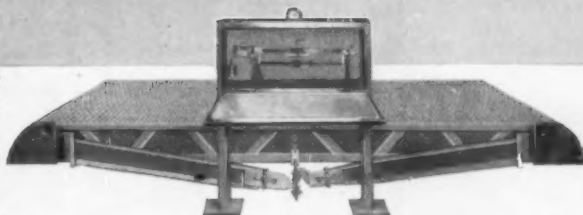
- L. W. LAMB, contractor of Holland, Michigan, is the 1955 president of the Contractors Division of the American Road Builders' Association.

H. S. MERRIMAN of Socony-Vacuum Oil Company, New York, was elected chairman of the International Road Federation of Washington, D. C. He succeeds Frank T. Magennis, of Good-year Tire and Rubber Export Company, who continues as a director.



THURMAN PORTABLE SCALES

*Need NO Coddling
... many moved dozens of times*



Truck scales as well as other construction and road building equipment can't be pampered or coddled. They've got to be able to "take-it" and perform properly under rugged operating conditions. Thurman Portable Truck Scales have been designed to meet these tough requirements of the industry. In addition to being portable and rugged these scales must perform accurately under all conditions.

Hundreds of Thurman Scales have been moved from job-to-job, some to over 30 different locations during a period of several years. Because the accuracy is carefully built into these sturdy scales—it remains there.

Installation on-the-job takes but a few minutes. Place the scale, as a unit, on firm, solid ground, "ramp-up" earth or gravel at both ends and you're ready to weigh. For more complete information on deck lengths (18 — 43 ft.) and load capacities (20 — 50 tons), write for our folder: "Accurate, Portable Weighing".

Precision Products Since 1918
THE THURMAN MACHINE COMPANY
Scale Division

DEPT. D, 156 NORTH FIFTH STREET • COLUMBUS, OHIO



Other Precision Scales by THURMAN

Batching
Electronic

Industrial
Liquid Weighing

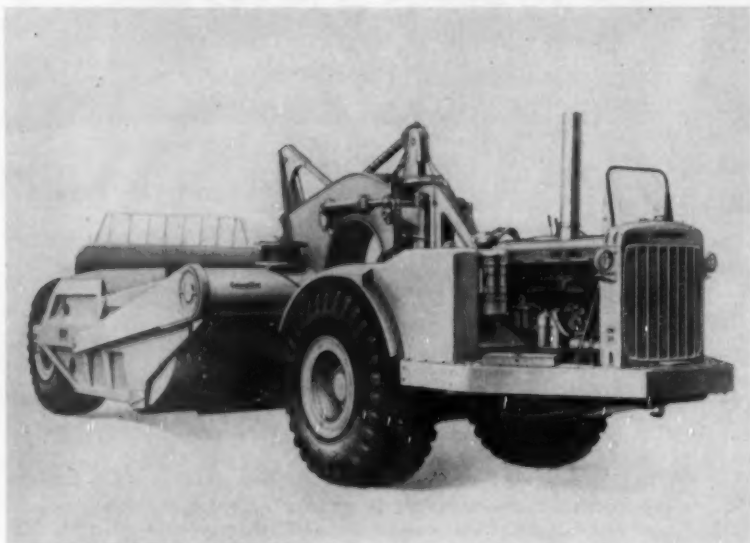
Pipe Lever-Hopper
Pit Scales

Warehouse
Wheelbarrow,

... for more details circle 258, page 16

What's New in Equipment and Materials

Reader Service Coupon on Page 16, more items page 157



- The new Caterpillar DW21 (Series C) tractor with No. 470 scraper features a redesigned diesel engine (300 hp). The scraper is wider and longer and has the new "lowbowl" design for easier and more economical loading.

Caterpillar Announces New Turbocharged DW21 and DW20 Tractors

Also new "low bowl" scrapers, new DW15 tractor, and a new oil clutch for the No. 12 motor grader were introduced at world-wide Caterpillar dealer get-together.

Caterpillar Tractor Co., Peoria, Ill., announces two new additions to its famous rubber-tired tractor line. They are the DW21 (Series C) and the DW20 (Series E), both featuring more horsepower and major design changes over the current models of DW21 and DW20 tractors. The models were unwrapped in Peoria at a world-wide conclave of Caterpillars 500 or more distributors.

The tractors have a powerful new diesel engine, rated at 300 hp at 1800 rpm. Piston displacement is a full 805 cu. in. Designed to set new performance records, the 6-cylinder, 5 $\frac{1}{2}$ x 6 $\frac{1}{2}$ in. diesel engine is turbocharged for greater horsepower. Driven by the engine's exhaust, the turbocharger utilizes energy that otherwise would be lost.

A number of new design features have been incorporated into the diesel engine, including a new block, crankshaft, connecting rods, pistons and head. A more

accurate valve train gives better engine operation with fewer adjustments needed. Hydraulic valve lifters keep the valves in perfect adjustment, reducing maintenance costs. The diesel engine utilizes new paper-type fuel filters which are more efficient and less expensive for the customer. A redesigned fuel system provides more accessibility for servicing.

Wide base tires, the result of three years of intensive Caterpillar-tire manufacturer cooperative research, are standard equipment (in rock-type tread) on the DW21 (Series C) and DW20 (Series E) tractors.

The 29.5-29 tires have been thoroughly field tested and give the new tractors more versatility, operating at lower pressures for big footprint flotation and wide lug traction.

The customer has a choice of either direct electric or gasoline starting. Speeds for the DW20 (Series E) range from a low of 2.8 mph to a high of 32.1 mph; on the DW21 (Series C) from a low of 2.3 mph to a high of 20.5 mph. New clutches give faster on-the-go shifting. Full-flow filters have been engineered into the hydraulic steering system to

keep the fluid completely free of foreign particles. Brake controls have been improved with roto-chambers for better performance.

New "Low Bowl" Scrapers

To better utilize the strength and additional power built into the new DW20 (Series E) and the DW21 (Series C) tractors, Caterpillar has designed two new matching scraper units — the No. 456 scraper for the DW20 (Series E) and the No. 470 scraper for the DW21 (Series C). These scrapers feature a new concept in scraper engineering — the exclusive Caterpillar "lowbowl" design. Wider and longer bowls increase the capacity to 18 yards struck and 25 yards heaped.

The new "lowbowl" design is more shallow, permitting faster loading due to less lifting effort involved. The new scrapers with their "lowbowl" design cut down on this internal resistance to loading.

A new high-lift apron has been developed, giving faster, more positive material ejection under all conditions. Higher ground clearance has been built into the scrapers to give them more work ability under extremely soft conditions and over rough terrain.

The same wide base 29.5-29 tires used on the new tractors are standard equipment to give better flotation. A larger pusher block protects the tires and insures positive pusher contact with the scraper, reducing to a minimum the possibility of damage to either the dozer or the scraper. The No. 456 and No. 470 scrapers have been strengthened at critical points to give the longest possible scraper life.

New DW15 Tractor

Caterpillar also announces that the DW15 tractor, just completing its first year in the field, has undergone some major design changes. Designated the new DW15 (Series C) tractor, it will feature a new 186 hp, 5 $\frac{1}{2}$ x 6 $\frac{1}{2}$ -in. engine — improved in design to give even greater service. Included in the changes is a new transmission case, designed to assure positive lubrication under the most adverse operating conditions.

The new DW15 (Series C) tractors will be equipped with the proven No. 27 Cable Control for more positive scraper response and increased cable control clutch and brake life. The dollar pinching Cable Saver will be standard equipment with No. 15 scrapers.

New Clutch for Cat 12 Grader

The oil clutch that has proved a huge success in Caterpillar track-type tractors is being introduced in the No. 12 motor grader as standard equipment. Caterpillar will begin immediate production of the improved machine and will introduce it at no additional price.

In principle, the oil clutch in the No. 12 motor grader works as follows. A separate pump, incorporated with the engine oil pump, supplies crankcase oil to the clutch. When the clutch is disengaged, oil surrounds the clutch discs,

cooling the facings. The two driven discs on the No. 12 have special resilient organic material facings bonded to them in which are a network of grooves to permit the oil to escape during engagement.

The free, circulating oil quickly dissipates the heat generated through the friction of engaging and disengaging the clutch. It also acts as a lubricant for all moving parts, including the pilot and throwout bearings.

Field tests show that the clutch facings undergo very little wear — in 1,000 hours of operation wear averaged only .0025 inches — less than the diameter of a human hair. The clutch facings are 1/16 in. thick, extending disc replacement periods thousands of hours over the former dry-type clutch.

After the initial break-in period, the No. 12 will operate a long period of time without clutch adjustment or slip-page.

For more information circle 106 on Service Coupon Page 16 and mail now.

Shovel Attachment for Low Clearance Loading

A new loading attachment, the Excaloder, announced by Link-Belt Speeder Corp., Cedar Rapids, Iowa, adapts the new Link-Belt Speeder heavy duty 1-yd. LS-98 shovel-crane for horizontal, straight-line loading operations.

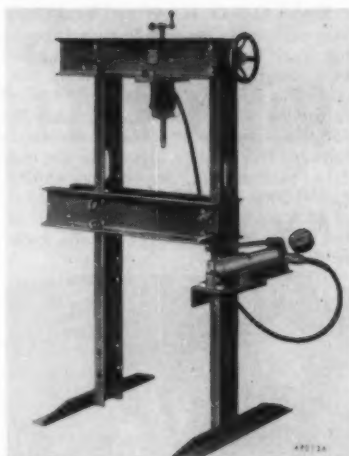
The Excaloder is an attachment that is interchangeable with the shovel, hoe, dragline, clamshell or crane attachments for the LS-98. It features exceptionally low overhead clearance — standard mast requires only 15 ft., 10 in. clearance height. An optional low mast has minimum clearance height of only 11 ft., 3 in. Maximum dumping height, with stick extended at 45°, is 16 ft., 11 in., and with stick retracted at 45°, is 11 ft., 4 in.

The Excaloder is operated by the LS-98 Speed-o-Matic controls. A Link-Belt Speeder exclusive, this true power hydraulic system provides fingertip control of all functions. Another advantage of the Excaloder is its straight line bucket action.

For more information circle 107 on Service Coupon Page 16 and mail now.



Link-Belt Speeder LS-98 with Excaloder Attachment and 1 1/4 yd. rock bucket



OTC 17 1/2 Ton Hydraulic Press

17 1/2 Ton Hydraulic Press Has New Features

A new open throat feature and a unique bed plate adjusting mechanism are two important time and labor saving developments incorporated in the new 17 1/2 ton hydraulic shop press announced by the Owatonna Tool Co., 435 No. Cedar St., Owatonna, Minn.

The horizontal bed channels extended beyond the upright channels forms an open throat arrangement greatly increasing the range of jobs the press can handle. In addition an adjusting wheel at the top of the frame makes possible fast and effortless adjustment of the bed channels to any desired working height.

Special window openings in the upright channels also are provided to accommodate long shafts and bars for straightening or service work. Full horizontal adjustment of the ram for off center work is afforded by the adjustable cross head attachment. As with all OTC press equipment, the 17 1/2 ton Power-Twin hydraulic ram and pump units are detachable and adaptable for use on many portable pulling and service jobs in the shop or in the field.

For more information circle 108 on Service Coupon Page 16 and mail now.

Tractor-Mounted Sweeper

A new tractor-mounted sweeper specifically engineered and built for the Oliver Super 55 tractor is now in production by M-B Corporation, New Holstein, Wis. The new sweeper features a standard broom, 72 in. long, 32 in. in diameter. Broom can be turned end for end for more even wear, and broom ground pressure is adjustable and spring-loaded to accommodate shocks and bumps.

Simple in design, the new Oliver-mounted M-B broom can be easily mounted and removed. Hood is quickly removed for snowsweeping. Tractor hydraulic system is employed to raise and lower broom with finger-tip control.



Oliver-Mounted M-B Broom

For more information circle 109 on Service Coupon Page 16 and mail now.

Weed and Brush Killer Chemical

A new, more concentrated, formulation of "Ammate" weed and brush killer has been announced by the DuPont Co., Wilmington, Del. Identified as "Ammate" X, the new formulation contains 95% of the active ingredient, ammonium sulfamate, instead of 80%. The new product will normally be used at the rate of 60 lb. per 100 gal. of water instead of 75 lb. Containers for the new formulation will be 60 lb. bags and 40 lb. fiber drums, corresponding to the previous 75 lb. and 50 lb. containers.

"Ammate" X weed and brush killer, like "Ammate," is recommended as a foliage spray for control of woody plants, and as a stump treatment to prevent resprouting.

For more information circle 110 on Service Coupon Page 16 and mail now.

New Scraper Has 41 Cu. Yd. Capacity

New scrapers with capacities up to 41 cu. yd., believed to be the largest standard models ever available, and said to be the first to offer the new wide base tires for greater flotation and carrying capacity, have been announced by Wooldridge Manufacturing Division, Continental Copper & Steel Industries, Inc., Sunnysvale, Calif. Of open bowl, cable operated type, the three new units are said to be engineered to utilize the full horsepower available not only with the largest tractors now built, but also with larger models announced for the future. The Wooldridge scraper Model OS-300 has capacities of 41.0 cu. yd. heaped, and 34.0 cu. yd. struck. The OS-260 is rated at 35.0 cu. yd. heaped, 30.0 struck, with side extension, or 32.5 heaped and



New Wooldridge Terra Clipper Scraper
26.0 struck without extensions. Model OS-200 with side extensions carries 28.0 cu. yd. heaped and 24.0 struck, or 26.0 heaped and 20.0 struck without extensions.

For more information circle 111 on Service Coupon Page 16 and mail now.

Air Entraining Agent

The new Sealtight air entraining agent has been announced by W. R. Meadows, Inc., 7 Kimball St., Elgin, Ill.

This new product, a clear, amber low-viscosity liquid, is a complete and homogeneous solution — guaranteed not to segregate, settle out or become gummy. It will not lose efficiency even during storage under adverse conditions such as winter low temperatures. Sealtight air entraining agent, according to the manufacturer, offers "greater air entraining potency." It is available in single and double strength solutions.

To use, add 1/2 to 1 oz. of this agent to the mixing water for each sack of cement to obtain a 3% to 6% volume of entrained air to the mix. Sealtight air entraining agent meets all essential specifications, and is accepted as an improved material by ASTM, Bureau of Public Roads, Corps of Engineers, and all other federal and state departments.

For more information circle 112 on Service Coupon Page 16 and mail now.

Hydraulic Loader

A new hydraulic loader, Model D4-H, for Caterpillar D4 tractors with non-oscillating tracks, has been announced by Ulrich Products Corporation, Roanoke, Ill. The D4-H features sturdy construction, fast operation, a wide range of bucket positions, and low cost.



Model D4-H Ulrich Loader

For more information circle 113 on Service Coupon Page 16 and mail now.

Hydraulic End Loaders

Two new hydraulic end loaders of 2,000 to 3,000 lb. capacity, suitable for use on 1 1/2 ton or larger trucks and trailers with van, platform and stake bodies, has been announced by The Galion Allsteel Body Co., Galion, O. The new end loaders, known as Model G 2000 and G 3000 Load-evator respectively, feature hydraulic opening and closing, single lever control of raising and lowering and compact design for easy installation on any truck or trailer.

Model G 2000 is operated by a single hydraulic cylinder mounted up between the truck frame rails. Power is supplied by a rear mounted gear-type pump driven by the truck's power take-off. A small hydraulic cylinder opens and closes the endgate through unique parallelogram linkage. This linkage also keeps the endgate level during opening and closing. Model 3000 Load-evator, similar to Model 2000 in design and construction, is fitted with a lifting cylinder of 50% greater capacity.



Model G 3000 Load-Evator

For more information circle 114 on Service Coupon Page 16 and mail now.

Reinforced Abrasive Blades for Cutting Concrete

A completely new series of reinforced abrasive blades for cutting contraction joints in "green concrete" has been marketed by the Clipper Manufacturing Co., Suite 698, 2800 Warwick, Kansas City 8, Mo. The new "GreenCon" blades have been developed into a series of specifications for cutting the widest possible range of "hard" to "soft" limestone aggregates — plus coral, steel mill slag, and the same aggregates with small percentages of granite, crushed river gravel.

Added advantages claimed for the new "GreenCon" series are found in the varying specifications which broaden the time limits when "green concrete" can be cut with these abrasive blades.

In addition to the double reinforcing through the center of the new Clipper blades, each blade is reinforced on both sides around the hub where the strain is greatest, stated to virtually eliminate blade breakage. New "GreenCon" blades are available in standard 14 in. diameters for cutting 1/2 in. wide joints.



New "GreenCon" Blade

For more information circle 115 on Service Coupon Page 16 and mail now.

Triple Duty Drilling Unit

A new self-contained drilling unit, the Triple Duty Drillmaster, announced by Ingersoll-Rand Co., 11 Broadway, New York 4, N.Y., is designed to speed up the drilling of rock and provide a range of hole sizes and drilling depths claimed to be heretofore not available in a blast hole drill.

The manufacturer says the new Drillmaster embodies three combinations or methods of drilling. In combination one it utilizes a new revolutionary Depth-Master or "down the hole" drill for deep blast holes up to 6 in. in diameter. In combination two, it is available with the Power-Master, a new heavy-duty hammer drill for 4 1/4 in. holes, and in combination three, with the Roto-Master rotary drill it is stated to be ideal for rotary drilling of holes up to 6 1/2 in. in diameter. The user can have any one or all three of the drilling combinations to suit his own requirements or rock conditions.



Triple Duty Drillmaster

For more information circle 116 on Service Coupon Page 16 and mail now.

3 1/2 - 4 Yd. Truck Mixer

A new standard 3 1/2 yd. truck mixer claimed to have outstanding operating and construction features has been placed on the market by The Jaeger Machine Co., Columbus 16, Ohio. The new mixer is designed to haul 3 to 3 1/2 yd. legal payloads on single axle trucks, 4 to 4 1/2 yd. legal payloads on lightest tandem axle trucks.

Up to 50% fuel savings are stated to obtain with its 4-cylinder engine which operated within maximum torque range. 3-speed Warner industrial transmission gives wide range of forward and reverse drum speeds from 1 1/2 to 16 rpm within economical engine speeds of 800 to 1600 rpm. Single-lever drum control is instantaneous and exact. New "Quick Lock" chute carriers save operator both time and effort. Improved "Swing Away" chute swings clear for direct discharge into hoppers. "Quick-Way" water injector eliminates water bells and packing glands. 25% larger discharge blades assure faster discharge of low slump concrete. Improved type open-end loader

Operation Peladow...

A NEW TECHNIQUE IN ROAD DUST CONTROL



BULK PELADOW*

SHIPPED DRY • UNLOADED MECHANICALLY
WATER ADDED



EASILY APPLIED AS PENETRATING
SOLUTION • MORE UNIFORM COVERAGE

*(Dow's Hi-test Calcium Chloride in Pellet Form)

Here are the facts about a new technique in dust control and stabilization of gravel or similar type roads. Peladow®, concentrated (94-97%) calcium chloride, is now being shipped dry in bulk hopper cars and applied *as a liquid*. Conventional liquid-type pressure spreaders are being used to do the job—do it more easily and at lower cost.

Look at the savings:

1. You pay only for product, not for package. Dry Peladow is shipped in bulk. Transportation costs are lower because of its concentrated calcium chloride content.
2. You save additional dollars in labor cost as there are no bags to handle, open and dispose of—no warehousing involved.

3. You eliminate the cost and time of pre-wetting the road surface or waiting for rain during dry spells.

Immediate results, the absence of back-breaking labor, plus the fact that you are always in control of scheduling the job and not dependent on the weather's cooperation, make this new technique even more outstanding. Whether you handle the job yourself or contract the work, this effective method is sure to bring economies to your road maintenance program. Interested? Send for your copy of "HANDLE WITH EASE" which will give you the full story of Peladow liquid application. Write to THE DOW CHEMICAL COMPANY, Dept. IN 901C, Midland, Michigan.

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DOW

... for more details circle 185, page 16



Jaeger 3 1/2 — 4 Yd. Truck Mixer

has steeper angle and bigger throat for fastest charging. Drum is of wear-resisting Man-Ten steel, with 1/4 in. double convex head, 3/16 in. automatic-welded shell and 3/16 in. die-formed spiral mixing blades.

For more information circle 117 on Service Coupon Page 16 and mail now.

General Purpose Paving Breaker

A new general purpose, medium-weight paving breaker, announced by Davey Compressor Co., Kent, O., is known as Model DB-60, and it is reputed to be adaptable to all types of demolition work and may be used for trimming work as well as down breaking. The DB-60 can be quickly converted into a highly efficient spike driver by replacing the fronthead with SP-75 spike driver attachment.

Outstanding feature of the new tool is the chrome plated cylinder bore which is said to reduce wear and substantially lengthen tool life. Other features include reversible piston hammer, extra large alloy steel fronthead bolts and springs and Davey Rocket Valve with double trip ports for increased work output.

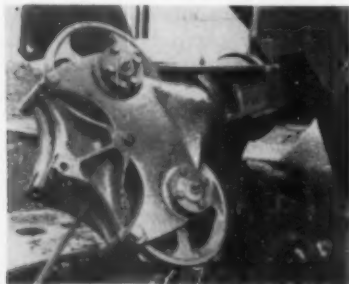
DB-60 has a net weight of 63 lb., length of 26 1/2 in. and width of 14 1/2 in.

For more information circle 118 on Service Coupon Page 16 and mail now.

Rotating Fairlead for Draglines

A new, full rotating type fairlead for use on Bucyrus-Erie 22-B 1/2-cu. yd. draglines is now available, according to an announcement from Bucyrus-Erie Co., South Milwaukee, Wis. Standard equipment on present 22-B models, this fairlead — with suitable bracket and anchor pin — can also be used to replace the old style swinging, or hinge type, fairlead on all 22-B draglines in the field.

The new unit is designed to lengthen drag rope life and lessen maintenance expense for fairlead guide plates and sheaves. The rotating fairlead instantly



New Rotating Fairlead on B-E Dragline

assumes the plane in which the rope bends over the sheave. Equipped with tapered roller bearings, it rotates so freely that its adjustment to the line of pull is instantaneous. The fairlead is located off center of the revolving frame in line with the rope lead from the center of the drum. The fairlead frame is symmetrical and carries two identical sheaves either of which can rotate to an up or down position. The frame is hollow in the trunnion, permitting the rope to lead to the drum without contact on fairlead frame.

Guide sheave or rollers are not required on this new style frame. The least contact of the rope with the guide plates causes it to rotate into line of rope pull and therefore chafing of the rope on the guide plates is negligible. The guide plates are reversible to give double wearing life.

For more information circle 119 on Service Coupon Page 16 and mail now.

Transit Has New Optical System

A newly designed optical system stated to provide precise stadia readings at greater distances and a clear, well-defined image features the new 1955 engineer's transit line announced by C. L. Berger & Sons, Inc., 37 Williams St., Boston 19, Mass.

Telescope in the 6 1/2 in. model is 26-power with coated optics and has a resolving power of 3 1/2 seconds, effective aperture of 1.430 in. and field of view of 1 degree, 6 minutes. Smooth focusing is stated to be assured by the use of an integrated rear bearing and eye piece mount; the object is easily brought into sharp focus with a negative lens actuated by a fine rack and pinion, and with a slow, even motion.

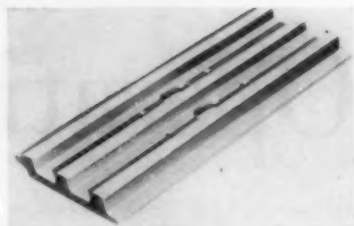


The 1955 Model Berger Bronze Transit

For more information circle 120 on Service Coupon Page 16 and mail now.

New Design Features for Traxcavators

New design features for the No. 6 and HT4 Traxcavators have been announced by Caterpillar Tractor Co., Peoria, Ill. Triple grouser shoes are now standard equipment on both the No. 6 and HT4 Traxcavators. These shoes have three full width, low profile grousers 11/16-in. high. Triple grouser shoes give better traction than the flat center shoe, while



Triple Grouser Shoe Standard on Caterpillar No. 6 and HT4 Traxcavators

still retaining the flat surface feature needed for hard-surface operation. The flat type track group will be available as an attachment. Present No. 6 and HT4 Traxcavator owners whose machines are working in the field with the flat shoes and who desire the better ground-gripping traction of the triple grouser may obtain the new shoe from Caterpillar dealers. The No. 6 Traxcavator will also feature as standard equipment the front section of the crankcase guard and a new full flow hydraulic oil filter which will greatly extend the life of the hydraulic pump, cylinders, and valves. A new, improved transmission has become standard on the HT4 Traxcavator. This transmission arrangement provides a new shift pattern, thus making the operator's job easier. The high reverse speed of the HT4 has been decreased, also, to make the unit usable on steeper grades and on softer ground.

For more information circle 121 on Service Coupon Page 16 and mail now.

Small Rubber Tired Ditcher

A small rubber tired ditcher, Model 702, has been announced by Barber-Greene Co., 400 No. Highland Ave., Aurora, Ill.

The Model 702 can be equipped with either of two digging booms. One digging 30 in. deep can be equipped with either a 2 1/2 in. or 4 1/2 in. bucket line. The other, digging 40 in. deep can be equipped with 2 1/2 in. or 5 in. lines. Switching from one digging width to another involves a change in bucket line, a job so simple that one man, with only hand tools, can perform it in from 15 to 20 minutes. The bucket line of the Model 702 consists of a series of replaceable heavy steel cutters, bolted to a steel roller chain. A simple system of rotating paddles and plows places the spoil neatly at the edges of the trench. Control of the machine's crowding speeds, during digging, is by means of a "Varidraulic" drive which offers the operator an infinite range of speeds from zero to 40



Model 702 Rubber Tired Ditcher

ft. per minute. The operator can vary the machine's forward speed instantly and continuously to suit the digging conditions of the moment. The same hydraulic drive system permits instant reversal of the ditcher's movement.

The digging boom may be raised out of the trench by a mechanical lift, in a matter of seconds. Raising the boom automatically puts the Model 702 in travel position.

For more information circle 122 on Service Coupon Page 16 and mail now.

Dumping Device for Straddle Carriers

A hydraulically operated dump device for use with its 20,000 lb. capacity straddle carrier has been announced by Clark Equipment Co. Through its use box-like containers for gravel, scrap, sand and other bulk materials can be picked up, transported any distance and dumped in a one-man operation. Fabricated from steel plate and heavy wall seamless steel tubing, the device is 'U' shaped, with the crossbar of the 'U' acting as the lifting member. Arms of the device are raised by two hydraulic chain hoists to a maximum 11½ ft. Load lifting capacity is 16,000 lb. Curved fingers projecting from one end of the box catch the lift bar to tilt the container forward. Containers can be fabricated by the user or obtained from Clark. Information on the straddle dump device can be obtained by writing to the Ross Carrier Division, Clark Equipment Co., Benton Harbor, Mich.



Straddle Dump Device

For more information circle 123 on Service Coupon Page 16 and mail now.

New Maintainer Has Torque Converter

A new improved maintainer featuring a torque converter and power sliding moldboard as standard equipment has been announced by Huber-Warco Co., Marion, O.

The new maintainer with many new features replaces the Huber maintainer built by The Huber Manufacturing Co., now a part of Huber-Warco.

Heading the list of features is a new hydraulic torque converter which automatically balances the torque of the engine to meet the load demand of the maintainer, at the same time protecting the maintainer from shock-loads, and increasing the life of the entire unit. Also standard is a power sliding moldboard which adds greatly to the working ca-

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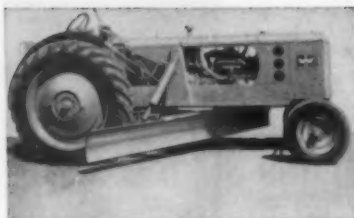
GOODMAN MANUFACTURING COMPANY

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Everything for
the aggregate
producer.



... for more details circle 261, page 16



New Huber-Warco Maintainer

capacity of the unit. On the job it means no deviation from the line of travel as an operator approaches culverts, abutments, or posts. As on the old model, the new maintainer features blade-pushing design of the moldboard, claimed to produce more work because power is transmitted directly from the driving wheel to the moldboard.

Either gasoline or diesel power is available — a Continental F-162 gasoline engine with 45% HP or a Continental GD-157 diesel engine with 40 HP. Five speeds range from 1.7 to 21 miles per hour.

The new maintainer is both heavier and longer than its predecessor. It weighs 7,200 lb. with calcium chloride solution in the rear tires. Its wheel-base is 9 ft. 6 in.

For more information circle 124 on Service Coupon Page 16 and mail now.

10-Ton Rubber-Tired Roller

A new heavy duty, multi-wheel, rubber-tired roller, announced by Shovel Supply Co., 4900 Hines Blvd., Dallas, Tex., Weighs 4500 lb. empty; ballasted with sand the weight is 10 tons. Among the features claimed for this roller are heavy, one-piece frame; 10-spoke wheels; oversize, dust-proof bearings (grease packed at the factory); spring-hung oscillating wheels and strong tongue and hitch. The roller is equipped with 6-ply, wide tread, smooth tires or standard tread, as desired. The wheels are arranged to provide complete coverage, the rear wheels overlapping the front.



Model RT-1300 Roller

For more information circle 125 on Service Coupon Page 16 and mail now.

Centralized Lubrication System

A simple, positive, high pressure centralized system has been announced by Lincoln Engineering Co. for controlled lubrication of bearings while machine is operating or while idle. The pumping unit is manually-operated and incorporates a 15 lb. capacity reservoir for grease or oil. A few strokes of the pump handle forces lubricant under 2500 psi pressure through a single line circuit of injectors, or adjustable hydraulic force-feed meas-

uring valves, one for each bearing. These injectors, or valves, in turn deliver a measured quantity of oil or grease to each bearing every time the system is cycled.

After a few strokes of the pump handle, an indicator device shows when lubrication cycle is complete. Release of pump handle by operator automatically vents and recharges system. Pump has button head filler fitting for refilling reservoir from a bucket pump, or may be hand-packed. System comes complete with all necessary accessories. No special tools or engineering knowledge is required to install system.

For complete details request Bulletin 807 from Lincoln Engineering Co., Industrial Division, 5702-42 Natural Bridge Ave., St. Louis 20, Mo.



High Pressure Centralized Lubrication System

For more information circle 126 on Service Coupon Page 16 and mail now.

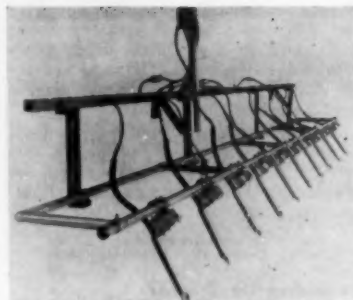
Full Slab Paving Vibrator Attachment

A new Hi-lectric full slab paving vibrator attachment, suitable for mounting on any concrete spreader or finisher has been announced by the Maginniss Power Tool Co., 134 Spruce St., Mansfield, O.

Capable of vibrating full slabs as much as 25 ft. wide to depths of 19 in. with Model HFSV-3 vibrators and thinner slabs with Model HPV-3 vibrators, the attachment mounts directly on the spreader or finisher. It consists of a light-weight, durable, sectional steel frame on which up to 10 spring-suspended Model HFSV-3 or HPV-3 concrete vibrators are mounted. No auxiliary carriage is required, the manufacturer states.

The frame and vibrators are raised, lowered and positioned by double-acting hydraulic cylinders mounted on adjustable brackets. A 4-way, 3-position valve connected to the spreader or finisher's hydraulic system controls the cylinders. Vibrators are turned on and off by a switch located within easy reach of the spreader operator.

Power to operate 10 vibrators is supplied by an 18.7 KVA generator with built-in exciter and voltage regulator of the magnetic amplifier type. Initial excitation is furnished by a 6 volt battery.



Hi-lectric Full Slab Paving Vibrator Attachment

The generator is driven by a 4 cylinder, liquid-cooled engine operating at 1,800 rpm. Electrical starting is available. The engine and generator are skid mounted for easy installation on any spreader or finisher.

For more information circle 127 on Service Coupon Page 16 and mail now.

Pavement Breaking Ball

A line of pavement breaking balls for contractors and street and highway departments has been developed by Eagle Iron Works, 139 Holcomb Ave., Des Moines, Ia. They are made of tough, close-grained semi-steel which withstands abuse and improves with age.

Eagle breaker balls have a well in the top which contains a securely fastened, readily replaceable ring for attaching the cable. The recessed ring as well as the cable is thus protected. Balls are available in six sizes, from 1,500 to 8,000 lb. Bulletin 252, sent on request, gives complete description.



Eagle Breaker Ball

For more information circle 128 on Service Coupon Page 16 and mail now.

New Model Hopto Digger

A completely new model of the Hopto digger has been announced by the Badger Machine Co., Winona, Minn. The new ¾ yd. model 360 Hopto has a full 360-degree swing from its travel position when boom is extended over the cab of the truck. Three-eighth and one-half yard non-spill backhoe and shovel buckets are available for the "360."

The completely hydraulic "360" has an extension arrangement which permits straight-sided vertical digging. Multiple-unit series valves and ¾ in. double-wire braided hoses with clamp-type reusable

ittings smoothly transmit the 60 GPM, 1400 psi power from the 71 HP Continental M-330.

A digging depth of 17 ft. with a surface reach of 24 ft., backhoe loading height of 12 ft. on a 16 ft. 6 in. radius and a shovel bucket loading height of 14 ft. at the same radius are features of the new machine. The "360" unit mounts on any 2½ ton or larger truck and is equipped with hydraulically operated outriggers for leveling and load distribution.



Hopto Model 360

For more information circle 129 on Service Coupon Page 16 and mail now.

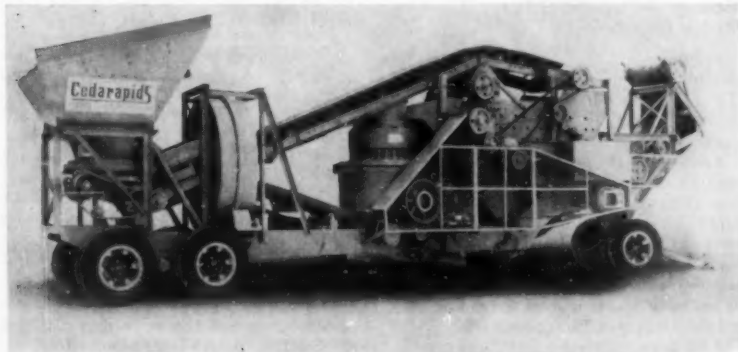
Portable Secondary Crushing Plant

The new Cedarapids Model 30-C portable secondary crushing and screening plant in which all crushing is handled by a 30 in. Symons R cone crusher built by Nordberg Mfg. Co., Milwaukee, Wis. has been announced by Iowa Manufacturing Co., Cedar Rapids, Iowa. The new Model 30-C is specially designed for use in quarries or gravel pits where the material is exceptionally hard.

The material is fed to the plant hopper equipped with a 30 in. reciprocating feeder which discharges onto a 30 in. wide feed conveyor to the 48 in. x 10 ft. two-and-a-half deck horizontal vibrating screen. Material retained on the top deck goes through the Symons cone crusher and recirculated back to screen for final sizing. Five different screen deck arrangements are available for producing up to three finished product sizes and available with a sand screw discharging onto side delivery conveyor.

The screen can be equipped with spray bars for producing washed aggregate. The Model 30-C can be driven by 150-175 HP gasoline or diesel engine or electric motor.

For more information circle 130 on Service Coupon Page 16 and mail now.



Cedarapids Model 30-C Portable Crushing and Screening Plant

Winches Have Aluminum Gear Case Housings

New 12,000 and 20,000 lb. winches, announced by Gar Wood Industries, Inc., Wayne, Mich., feature a fully enclosed back-draft clutch, an aluminum gear case housing, shrouded drum flanges and built-in rope clamp. The new winches are being constructed in both standard and lowmount models.

Both the 12,000 and 20,000 lb. capacity winches, feature the Gar Wood automatic self-energizing "safety brake." The safety brake automatically holds a full load up to specified rating; it is an air cooled unit, and is easily adjustable. For free-spooling operations a band brake is available for the standard winches.

The 12,000 lb. winch holds 960 ft. of ¾ in. rope, 603 ft. of ½ in. rope and 343 ft. of ⅜ in. rope. Incorporating a 2-in. drum shaft, the winch has a worm gear ratio of 23 to 1. Input is 240 rpm and worm torque is rated at 2610 lb. inches. Torque of the brake is 258 lb. inches. By utilizing a 9/16 in. diameter rope wound to seven layers, the drum of the 20,000 lb. winch holds 510 ft. For a ¾ in. diameter rope wound to six layers, drum capacity is 383 ft. When a ½ in. rope is used, wound to five layers, drum capacity is 268 ft. Drum shaft diameter of the winch is 2-7/16 in. and worm gear ratio is 29 to 1. With an input of 257 rpm, worm torque is 4120 lb. in., and brake torque is 406 lb. inches.

For more information circle 131 on Service Coupon Page 16 and mail now.

3-Axle Tandem Roller

A new 3-axle tandem roller announced by The Galion Iron Works & Mfg. Co., Galion, O., has a variable weight range from 14 tons (metal weight) to 20 tons fully ballasted with water. In addition to the main compression or drive roll, it has twin guide rolls with synchronized hydraulic steering.

An important feature of the roller is that it is supplied with a Roll-O-Matic torque converter drive as standard equipment. The Galion Roll-O-Matic torque converter drive has no gear shift mechanism. Furthermore, it is stated to automatically multiply the engine driving force by means of oil in motion instead of by transmission gears, to automatically apply the driving force as the work de-

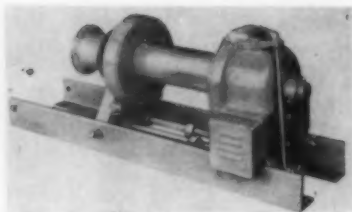
NEW ALLIS-CHALMERS HD-16, HD-21

...with Torque Converter Drive

Allis-Chalmers, user of fluid connection in crawler tractors since 1940, again features *Twin Disc Torque Converter Drive* . . . as standard equipment on the new HD-21 . . . and as optional equipment on the new HD-16. Twin Disc and A-C engineers, working together, designed the *Torque Converter Drive* to meet *each* crawler tractor's exclusive requirements. Result: more production, greater versatility . . . *outstanding performance* on a wide variety of applications.

Write *Twin Disc* for *Torque Converter Bulletin 135-D*. **TWIN DISC CLUTCH COMPANY, RACINE, WISCONSIN, Hydraulic Division, Rockford, Illinois.**





Galion New 3-Axle Tandem Roller

mands, and to automatically maintain desired roller speed regardless of grade or working conditions. Elimination of master clutch, gear shifting, and shock loads, is stated to result in ease of operation. Rolling speeds from .8 to 5.5 mph are available. Engine braking power on downhill grades is smooth and effective.

For more information circle 132 on Service Coupon Page 16 and mail now.

Lumber Stain Control Chemical

A new 2-lb. package of "Lignasan" fungicide, blue stain control chemical for lumber, has been announced by the DuPont Co., Wilmington, Dela. The new package makes it easier to prepare the recommended concentration for lumber treatment. It also reduces exposure to the chemical since no scooping or weighing is necessary. Two pounds of chemical is the right amount for 100 gal. of solution to treat 8,000 to 10,000 board feet. The manufacturer recommends preparing a pre-mix in a drum beside the vat, and piping it into the vat solution as needed.

"Lignasan" has been used by the lumber industry since 1930, for control of the fungi which cause sap stain or blue stain. It is based on ethyl mercury phosphate, and is suitable for use on both hardwoods and softwoods. The new package is packed in steel drums — 50 gallons to a drum.

For more information circle 133 on Service Coupon Page 16 and mail now.

Heavy Duty Preparerizer Has Increased Power

An increase of 30% in power for its P-600 heavy duty preparizer has been announced by Pettibone Wood Mfg. Co., North Hollywood, Calif.

Other improvements in this scarifying and pulverizing unit is a dual drive to both ends of the rotor shaft, equalizing the delivered power and providing positive, more evenly balanced power transmission. Drive transmission has four rotor speeds. Reversed rotor operation is stated to enable machine to pulverize extra



P-600 Heavy Duty Preparerizer

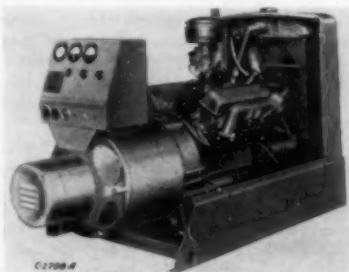
hard materials which heretofore were thought impossible to process. Fuel tanks, on shockproof mountings, are now located at rear of operator's platform, giving operator easy access to controls and an unobstructed view. Wheels are equipped with depth gauges to control depth of cut or pickup.

For more information circle 134 on Service Coupon Page 16 and mail now.

New Line of Electric Plants

Two new series (25EC, 25,000-watt and 35ED, 35,000-watt) of Ford-powered electric generating plants, announced by D. W. Onan & Sons, Inc., Minneapolis 14, Minn. have Onan-built generators specially designed with excellent motor starting ability to handle the many unusual electrical requirements demanded of modern emergency equipment.

The two new series are powered by 6-cylinder (25KW) and V-8-cylinder (35-KW) overhead-valve Ford engines. These gasoline-driven units, with increased compression ratios and reduced friction factor are stated to deliver more useable power on less fuel. The generators for these new electric plants have been designed and built by Onan. They are revolving field generators and have 2% (plus or minus) voltage regulation and 3-cycle frequency regulation. They are heavy-duty generators, conservatively rated for continuous service. Long life features include: Self-aligning semi-flexible drive disc, drip-proof construction, all-weather insulation, constant pressure brush springs, double-sealed prelubricated ball bearing and automatic voltage regulator. All standard voltages are available for 60-cycle 1-phase and 3-phase models.



New 35ED Onan Electric Plant

For more information circle 135 on Service Coupon Page 16 and mail now.

Mower Attachment for Motor Grader

A fully hydraulic mower that can be attached to an Allis-Chalmers model "D" motor grader has been announced by the Triumph Machinery Co., Hackensack, N.J.

Known as the "Hydro-Clipper," the mower can be either attached or removed in a matter of minutes. Only 4 bolts are required and the mower is operated entirely by the hydraulic pump on the grader. The over-all width of the "D," with mower in transport position, is only 95 in. while the height of the cutter bar, in raised position, is approximately 7 ft. The 90 degree cutter-bar breakaway, with exclusive automatic self-return feature is

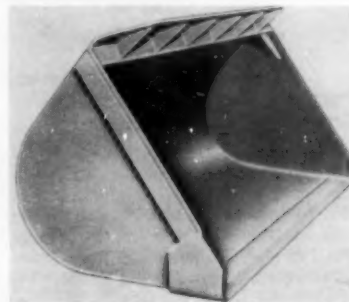


Hydro-Clipper or Motor Grader

claimed to make the "Hydro-Clipper" ideal for work in heavy brush.

For more information circle 136 on Service Coupon Page 16 and mail now.

3 Cu. Yd. Bucket for Traxcavator



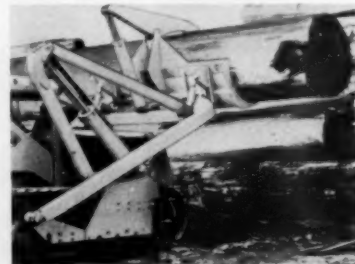
New Bucket for Traxcavator

A new two-position light material bucket with a 3 cu. yd. capacity is now available as an attachment for the No. 6 Traxcavator, according to an announcement by Caterpillar Tractor Co., Peoria, Ill. This bucket is designed to handle, more rapidly, products such as coal, cinders, expanded slag, lightweight aggregate and other light materials weighing 2,000 lb. or less per cubic yard.

For more information circle 137 on Service Coupon Page 16 and mail now.

Front-End Loading Attachment

A new front-end loading attachment, designed for mounting on Models 6-C, 7-C and 8-C hydraulically operated Austin Overshot Loaders, has been announced by the Austin Division, Central Ohio Steel Products Co., Galion, O. The new



Austin Overshot Loader with Front-End Loading Attachment Mounted on Caterpillar D8 Tractor

attachment consists of an open end bulldozer blade on which is mounted a large fabricated steel hook actuated by a double-acting hydraulic cylinder. With this attachment, Austin Loaders can load logs, piling, large diameter steel pipe, timbers, culvert and sewer pipe as well as other materials, the manufacturer states.

For use as an Overshot Loader, the front-end loading attachment is interchangeable with the standard Austin Overshot bucket. Austin front dump bucket and grizzly screen attachments can also be used.

For more information circle 138 on Service Coupon Page 16 and mail now.

7 Cu. Yd. Euclid Scraper

The latest addition to Euclid's line of motor scrapers, the Model S-7, is now in production by Euclid Division, General Motors Corp., Cleveland 17, O.

The S-7 is Euclid's first overhung engine scraper to go into production. It is powered by a 143 H.P. diesel with a 5 speed transmission. Tires are 18.00 x 24, 16 ply, and for jobs requiring maximum traction and flotation 21.00 x 25 tires are available at additional cost. All of the scraper operations, bowl, apron and ejector, are controlled by hydraulic lever action. This feature is stated to provide independent control and to eliminate the down time and expense resulting from cable breakage. There is only one 11 ft. section of cable, used for the apron lift on the S-7.

A four section cutting edge, with each section identical, adjustable and reversible, is stated to provide the most efficient blade arrangement for any type of material and to give longer blade life.

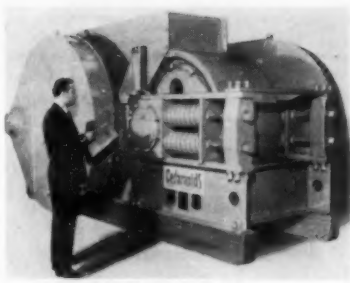


Model S-7 Scraper

For more information circle 139 on Service Coupon Page 16 and mail now.

55 in. x 30 in. Roll Crusher

A new 55 in. x 30 in. roller bearing roll crusher has been announced by Iowa Manufacturing Co., Cedar Rapids, Iowa. It can be used for any secondary crushing operation where a roll crusher can be used. The large diameter of the rolls makes it possible to handle exceptionally large feed. With 20% wider roll shells, capacities range up to 520 tons per hour depending upon size of finished product desired and characteristics of the material. Maximum finished size is 5 in. and minimum is 1/4 in. Engineered for high capacities with generous size shafts and Timken tapered roller bearings provide maximum long wear and economical operation. Finger timing gears of chrome molybdenum steel for positive, smooth, trouble-free operation transmit the power from stationary to floating roll.



Cedarapids Model 5530 Roll Crusher

The Model 5530 can be equipped with two smooth roll shells, two corrugated ones or one of each depending upon operating requirements. Safety shear plates protect the crusher against tramp iron or uncrushable material. The opening between the rolls can quickly and easily be adjusted by inserting or removing shims in a slot on top of the frame. For complete specifications, write to Iowa Manufacturing.

For more information circle 140 on Service Coupon Page 16 and mail now.

Concrete Saw

A new concrete saw, announced by the Champion Mfg. Co., 2028 Washington Ave., St. Louis, Mo., has a 14.6 HP gasoline engine, easily accessible to provide maintenance without the costly slow-down of preliminaries. The Champion power plant is stated to deliver smooth, steady power to the blade arrangement, eliminating binding and choppy bucking.

Another feature of the saw is its balanced design. The welded steel construction was designed with its weight evenly distributed over four ball-bearing rubber tire wheels. This center balance is stated to allow even three wheel contact to hold the saw true and steady even over the roughest surfaces. Since the blade won't ride out of a cut, no valuable time is lost in repetition.

Other features are "flip-up" dual blade guards which allow easy blade switching from side to side, a water hose and apron, a belt guard.



Champion Concrete Saw

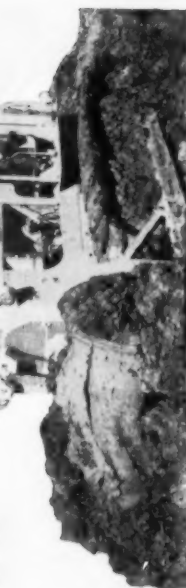
For more information circle 141 on Service Coupon Page 16 and mail now.

NEW CATERPILLAR DIESEL D8, D9 TRACTORS

... with Torque Converter Drive

To make sure of highest possible performance from the new CAT D8 and D9 Tractors, Twin Disc and Caterpillar engineers developed Twin Disc Torque Converter Drive matched precisely to each tractor's power characteristics . . . and available as a new optional feature for faster, easier work cycles.

Increase the work output of your powered equipment—write Twin Disc for Torque Converter Bulletin 135-D. TWIN DISC CLUTCH COMPANY, RACINE, WISCONSIN, Hydraulic Division, Rockford, Illinois.

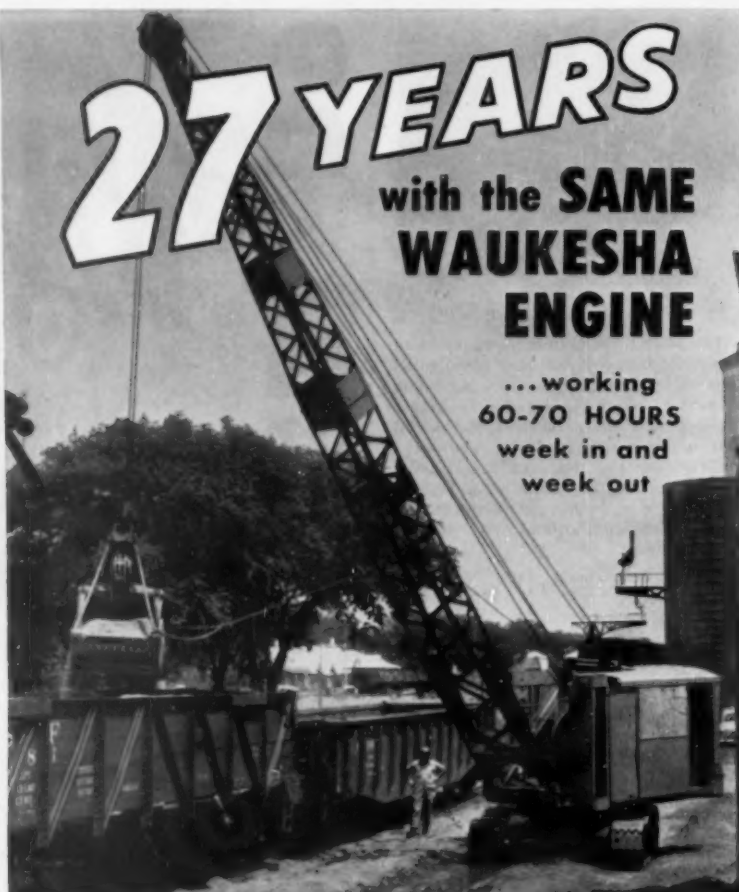


... for more details circle 253, page 16

27 YEARS

with the **SAME**
WAUKESHA
ENGINE

...working
60-70 HOURS
week in and
week out



Unloading 32 railway cars of sand in 9 hours! That takes a fast operator, a good crane, and speedy, responsive, reliable power.

Contractors **L. V. Hites and M. W. Martin** of Topeka, Kansas, have such a combination.

Operator, **Earl Walker**, has been speeding up construction jobs with this Waukesha Engine powered

American Crane ever since 1928.

That's 27 years' straight—working 60 to 70 hours every week. The Waukesha JL (Serial G-181) is the crane's original engine. It's had several overhauls, of course. Once it got a set of second-hand blocks (when new ones couldn't be had). Sure they offer Earl new cranes. He likes this crane and its Waukesha.

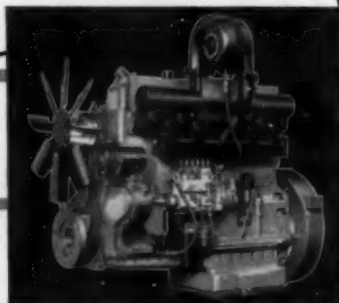
...and modern Waukesha Engines have even greater stamina and reliability

GAS • GASOLINE • NORMAL or TURBOCHARGED DIESELS
—up to 1135 horsepower for every industrial service

Modern 1197 cu. in. Waukesha Turbo-charged Diesel—Model WAKDB5—over 350 hp—used in many makes of cranes, shovels and heavy trucks. Send for bulletin.

279

WAUKESHA MOTOR COMPANY
WAUKESHA, WISCONSIN
NEW YORK • TULSA • LOS ANGELES



... for more details circle 230, page 16

Manufacturers' Literature

Front End Loader

A new 4-page 8½ in. x 11 in. brochure describing the Merton Overloader, has been issued by the Seaboard Equipment Co., Inc., 7 Hanover St., New York 5, N. Y. The Merton features fast straight line loading and variable height discharge for economical handling of bulk materials, which is discussed in detail. Well illustrated and in two colors, the brochure includes application suggestions, actual performance reports, optional equipment and complete specifications.

For more information circle 142 on Service Coupon Page 16 and mail now.

190 HP Diesel Power Unit

An 8-page booklet describing the UD-1091 power unit has been published by International Harvester Company's industrial power division. The UD-1091 is the largest diesel model in International's line of 18 heavy-duty power units. The 6-cylinder, valve-in-head engine develops 190 HP at 1,400 rpm.

Featuring heavy-duty construction, the unit has a counterbalanced crankshaft; seven precision replaceable bearings; replaceable, hardened cylinder sleeves; and chrome-plated top piston rings. The precision fuel injection system has twin plungers for equal power from all cylinders, inbuilt full speed range mechanical governor, and reserve torque control for extra lugging ability. Other features are dependable, all-weather starting; long life, full-pressure lubrication, and temperature controls for top efficiency. The UD-1091 is designed for use both as stationary power and for installation in powered machines such as shovels, air compressors, rock crushers, and generators.

The new booklet contains full specifications photographs, and performance charts on the UD-1091 as well as descriptions of available attachments. To obtain a free copy, write to Consumer Relations Department, International Harvester Co., 180 N. Michigan Ave., Chicago 1, Ill.

For more information circle 148 on Service Coupon Page 16 and mail now.

Hyster Job Attachments

The second printing of the Hyster booklet, "9 Profitable Minutes for Contractors" (Form No. 1305) is available from Hyster Co., 2902 N. E. Clackamas St., Portland 8, Ore. The brochure outlines methods of increasing productivity through the use of Hyster job attachments on either new or used tractors. It is prepared from on-the-job case histories. Information is given on the econo-

mies of using tractor tools for profitable fill compacting, trenching, shoveling, pile driving, winching, yarding, bituminous salvage and other construction tasks. Pictured are many of over 30 different Hyster attachments including the Hystaway excavator crane, grid roller and Hyster donkeys, yarders and winches.

For more information circle 149 on Service Coupon Page 16 and mail now.

Eight Models of Scrapers

A new 8-page booklet depicting Caterpillar Tractor Co.'s complete line of scrapers has been released by that company. The booklet contains photographs of different size Cat scrapers working on various construction jobs throughout the world. The booklet stresses bigger loads, faster round trips, stability for speed, controlled ejection and high apron lift. Newly improved scrapers in the Caterpillar line make this booklet the most up to date publication on the company's eight models of scrapers. The booklet, form DE528, may be obtained from Caterpillar Tractor Co., Peoria 8, Ill.

For more information circle 150 on Service Coupon Page 16 and mail now.

Light-Weight Pumps from Aluminum Alloy

A new bulletin 55 LW describes a new line of light-weight pumps manufactured by Rice Pump & Machine Co., Belgium, Wis. Capacities range from 5-500 gph for the junior flyweight to 18-000 gph for a senior model. Stated to be one-third the weight of conventional cast iron models the junior flyweight can be carried around the job. Complete with carrying handles the flyweight weighs only 52 lb., in its aluminum frame design. All models are available, when specified as alternate, in cast iron construction. Four cycle, air-cooled, nationally serviced engines power the new line of light-weights.

For more information circle 151 on Service Coupon Page 16 and mail now.

Reflective Marking Material

A new catalog (No. 354) has been released by Prismo Safety Corp., Huntington, Pa., giving a complete description of its complete line of reflective marking materials such as traffic stripes, zone and cross-walk markings and pavement word legends.

For more information circle 152 on Service Coupon Page 16 and mail now.

Concrete Plants

A new 44-page bulletin issued by The C. S. Johnson Co. Koehring subsidiary, P.O. Box 71, Champaign, Ill. contains much valuable data on plant arrangements and operation. It gives suggestions for planning concrete plants for central-mix, for transit-mix and for concrete products. Comprehensively covered in the bulletin are the following subjects: concrete plant installations, basic steps for concrete plant analysis, plan views of concrete plant sites, typical plants, bin selections guide for plants, aggregate storage bins, batchers, cement silo capaci-

ty guide, cement handling and storage equipment, auxiliary aggregate handling equipment, and heating equipment, aggregate and water.

For more information circle 153 on Service Coupon Page 16 and mail now.

Dense Graded Aggregate Road Construction

Manual SM-1, "Calcium Chloride of Stabilization of Bases and Wearing Courses," a new publication of the Calcium Chloride Institute, was written to assist highway engineers, contractors, and materials suppliers when they use calcium chloride in the construction of dense graded bases and wearing courses. The manual deals with the properties and design, types and methods of construction, and specifications. It is well illustrated, and information is presented as a guide for both design and construction engineers. The principles and recommendations presented are the result of many years of field applications and laboratory research on the subject. Copies of this manual may be obtained free on request to the Calcium Chloride Institute, 909 Ring Building, Washington 6, D.C.

For more information circle 154 on Service Coupon Page 16 and mail now.

Replacement Parts for Dragline Buckets

Replacement parts for any make or model of dragline bucket are described in an entirely new catalog released by Electric Steel Foundry Co., Portland, Ore. Typical example of the contents are: information on how to determine proper drag chain length; drag and hoist chain specifications; maintenance tips and alloy recommendations. Also included is information on several new products such as the new Esco "Spring Lock" hinge repair links for drag chains.

The 28-page, 2-color catalog is indexed and tabbed for speedy reference to parts, and parts specifications are presented in groups; for example, all of the hoist chain parts are together.

Copies of this new catalog are available from Electric Steel Foundry Co., 2141 N.W. 25th Ave., Portland 10, Ore. Write for Esco Replacement Parts Catalog No. 108-K.

For more information circle 155 on Service Coupon Page 16 and mail now.

Small Job Paving Machine

Blaw-Knox Company's small-job paving machine, the Adnun Jr. 8, is the subject of new bulletin, No. 2609, issued by the company. More than a hopper-on-wheels, the Adnun Jr. is equipped with a 12 HP motor for maneuvering the empty paver and for supplying power to the oscillating screed and rotating breaker bar. Hopper capacity of the machine is approximately 2 tons. It will pave an 8-ft. strip. Engineering details and on-the-job performance data are available upon request by writing for Bulletin No. 2609, Construction Equipment Division, Blaw-Knox Co., Pittsburgh 38, Pa.

For more information circle 156 on Service Coupon Page 16 and mail now.

NEW INTERNATIONAL TD-24

Torque Converter Crawler



For smoother, more flexible operation with greater output per day, Twin Disc and International engineers tailored Torque Converter Drive to the new I-H TD-24 Torque Converter Crawler's exact characteristics. As a new optional feature, Twin Disc Torque Converter Drive utilizes more available horsepower. Write Twin Disc today . . . request Torque Converter Bulletin 135-D. TWIN DISC CLUTCH COMPANY, RACINE, WISCONSIN, Hydraulic Division, Rockford, Illinois.



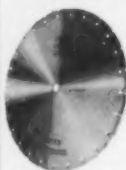
. . . for more details circle 254, page 16

There's **MORE NEW** than the streamlining
ROCK it back...
TILT it forward

AMAZING BALANCE on front or
 rear wheels alone gives you
 a new degree of maneuverability!

No other heavy-duty concrete cutter can compare with the new Felker Model 254! See what maneuverability is really like! Quickly gets into and out of the tight spots, does all jobs without mankilling effort, turns in its own length! See how Blade-Saver Collars stretch out blade life! Try the "254" today... Ask for demonstration from your nearest Felker distributor!

NEW FOLDER GIVES DATA—
 Before buying any concrete
 cutter get these facts! They'll
 convince you here's the best
 buy in the whole field!



**Felker Di-Met
 SEGMENTED TYPE BLADES**

Preferred for maximum footage at lowest cost-per-cut. Wide range of bond variations for maximum life under every condition! Ask also about the new Felker Abrasive Blades for cutting green concrete, where applicable.



FELKER MANUFACTURING CO.

TORRANCE • CALIFORNIA

World's Largest and Oldest Manufacturer of Diamond Abrasive Cut-Off Wheels and Machines



- 25 H.P. WISCONSIN!
- NEW "BLADE-SAVER" COLLARS!
 Pat. App. For. Trademark Reg.
- SELF-PROPELLING DRIVE!
- HYDRAULIC BLADE ACTUATION!
- CUTS TO 6 3/4" DEEP!
- BUILT-IN COOLANT PUMP!
 Many other features!

... for more details circle 187, page 16

WHAT ABOUT YOU, MR. READER?

Are you still active in the field? Have you moved or changed your position?

Unless you send this information directly to us we can't be sure. Sometimes a reader's name is cut from the mailing list because we are not sure that our information as to name, title and address is right. *Your* name might be cut from the mailing list.

Don't Let This Happen to You

Even if you think we know all about you, please fill in the information requested below and send to us by return mail. Our auditors require proof of accuracy of our mailing list. *You* are the only person who can help us on this. Do it now before you forget, so you can be sure your magazine will always be properly addressed to you. New names cannot be added or old names retained on our list unless we have *all* this information. *Please print or type.*

ROADS AND STREETS

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- ☐ I do receive **ROADS & STREETS** and wish to continue to receive it.
- ☐ I do not receive **ROADS & STREETS** but would like to have it.

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CITY _____ ZONE (if any) _____ STATE _____
 (If you have moved give old and new address)

SIGNATURE _____

Bituminous

ROADS AND STREETS



Flexible road base being constructed under Tennessee's new specifications, which call for calcium chloride and water with crushed limestone containing a high percentage of fines. Knoxville Construction Company is placing three 6-in. courses to be topped with asphalt mix. Two Jaeger self-propelled aggregate spreaders used in tandem for each course.

Published by Gillette Publishing Company
22 West Maple Street, Chicago 10, Illinois

Bituminous Materials for Treatment and Patching (Va.)
Seal Coats with Latex Tested — W. H. Alcock
Can Density and Stability Tests Be Matched?
Electronic Bin-Level Indicators for Asphalt Plant

JULY 1953

**Built in '24
Rebuilt since...**

**Still has
original
tank!**



**One of
16 Allied
Etnyres in
operation
during '55**

Ease and accuracy of Etnyre operation help Allied Bitumens break-in "green" men

What a testimonial! Allied Bitumens, Inc. of Buffalo, New York, was organized twenty years ago. In 1938 the firm purchased three used "Black-Toppers" which had been built originally in 1924 and 1925. Each of these 30-year-old Etnyres has been rebuilt, but the tanks are original . . . and they have never leaked!

According to C. W. Allemeier, Secretary of Allied: "This long life, excellent service, and low upkeep are important reasons why we continue to buy Etnyres." Including two new Etnyres delivered in 1955, the Allied fleet now

consists of sixteen "Black-Toppers."

As Mr. Allemeier points out, his is a seasonal business, requiring the annual break-in of many new drivers. This problem is simplified by the ease and accuracy of Etnyre operation.

With experience like this to guide you, why put up with anything but the very best in distributing equipment? Contractors everywhere agree that you'll turn out better jobs, in less time, at lower cost with Etnyres. Get all the facts — see your nearby Etnyre Dealer, or write E. D. Etnyre & Co., Oregon, Illinois, U.S.A.

SEE YOUR ETNYRE DEALER

ETNYRE
"Black-Topper"

BITUMINOUS DISTRIBUTORS



... for more details circle 186, page 16

DO YOU "STACK" MATERIALS?



DO IT BEST WITH BARBER-GREENE CONVEYORS!

If you "stack" or stock-pile materials, quite probably you can streamline your operation with a Barber-Greene Stacker Conveyor.

Stacker Conveyors—a Barber-Greene development—deliver more material at less cost. First of all, the initial cost is less because you build the system with components selected from the complete, standardized B-G line, eliminating the expense involved in designing and erecting a "tailor-made" system. Secondly, you save during the system's entire life, thanks to reduced operating costs.

There are three basic stacker conveyors—radial, traveling and fixed types—and your B-G distributor is ready to assist you in selecting the kind best suited to your needs.

TYPICAL STACKER APPLICATIONS






- For the stock-piling of bulk materials such as sand, gravel and aggregates
- In mining operations where ore or coal is stock-piled to suit market or seasonal conditions
- In material yards, ready-mix plants or coal yards where classification into separate bins or large stock piles is advantageous for meeting peak demands
- For disposal of waste material
- Wherever structural supports in stock pile handling operation of reclaiming machines

write for information!

Barber-Greene

AURORA, ILLINOIS, U.S.A.

WRITE for
INFORMATION

descriptive  literature... sound  movies
cost  studies... nearby  job inspection... plant  layouts

... for more details circle 170, page 16

ROADS AND STREETS, July, 1955

4 Steps to Better Paving

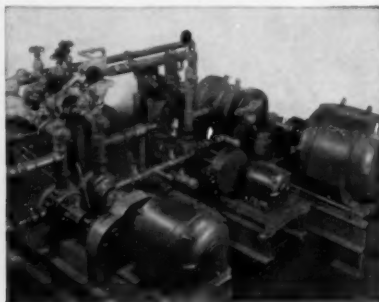
with EMULSIFIED ASPHALT

CONTINUOUS RESEARCH and "pilot studies" are conducted in the central laboratory at Lafayette. All McConnaughay-Approved Specifications run the gauntlet of at least two years' laboratory testing and development, followed by five years of field tests.



ACCURATE MIXING of emulsions and aggregates according to McConnaughay Specifications designed to meet general as well as local requirements. All McConnaughay Licensees are experienced contractors who bring practical "know how" to mixing operations.

QUALITY-CONTROLLED PRODUCTION of emulsions through mills designed to handle up to 100,000 gallons per day (Model B-14-18 illustrated). McConnaughay mills have outstanding records of dependability extending over 25 years of successful operation.



EFFICIENT LAYING...the final step in the coordinated service from laboratory to emulsifier to mixer to paver. Our extensive, closely-knit organization, fully experienced in all phases of the industry, gives assurance that McConnaughay Licensees will do the job right.

Look to your nearest McConnaughay Licensee for the fast, dependable service on any paving job. Fully equipped to take on complete contracts or provide the laboratory facilities, emulsions and technical services required...he is always ready to work with you closely in solving any problem. If you are figuring on highway, street, or general paving, get in touch with your nearest McConnaughay Licensee or contact...

K. E. McCONNAUGHAY LAFAYETTE INDIANA
EMULSIFIED ASPHALT PLANTS AND PROCESSES

McCONNAUGHAY LICENSEES Operating K. E. McConnaughay Emulsified Asphalt Plants

Bituminous Materials Co.
P. O. Box 267, Terre Haute, Ind.
Wabash Valley Asphalt Co.
Terre Haute, Indiana
Brookman Construction Co.
17th & Gharkey Sts., Muncie, Ind.
Fauber Construction Co.
Lafayette, Indiana

Asphalt Materials & Construction, Inc.
960 E. 22nd, Indianapolis 2, Ind.
Ready-Mix Asphalt, Inc.
P. O. Box 882, Fort Wayne 6, Ind.

Walsh & Ikeler
R. R. #2, Gary, Indiana

Bituminous Materials Co.
416 S. Water St., Jackson, Mich.

Bituminous Materials Co.
318 Atlantic St., Bay City, Mich.

Emulsions, Inc.
Lawrenceville, Illinois

Bituminous Materials & Supply Co.
415 Maple St., West Des Moines, Iowa
Plants:

Spirit Lake, Iowa
Iowa City, Iowa

Menlo, Iowa

Doherty and Swearingen Co.
53 Main St., Yarmouth, Maine

Berkshire Asphalt Co., Inc.
620 Berkshire Ave., Springfield, Mass.

James Huggins & Sons, Inc.
Medford & Commercial Sts.

Malden 48, Massachusetts

C. C. Plumb, Elmwood Station
P. O. Box 65, Providence 7, R. I.

C. C. Plumb
Portland, Connecticut

Albany Asphalt & Aggregates
75 State St., Albany, New York

Knight Paving Products, Inc.
1655 Union Rd., Gardenville, N. Y.

Knight Paving Products, Inc.
Vine Street, Ithaca, New York

Knight Paving Products, Inc.
1980 East Ave., Rochester 10, N. Y.

Knight-Bitumen Corp.
Watertown, New York

Seaco, Incorporated
2700 Industrial Drive, Columbia, S. C.

E. A. Mariani—Emulsified Asphalt
Hooker's Point, Tampa, Florida

Pan-Am Southern Corporation
P. O. Box 2, New Orleans 6, La.

(Also serving Alabama and Mississippi)
Asphalt Products Co., Inc.
Powell Ave., Nashville 11, Tenn.

Eastern Representative:

John A. Dow
157 Church St., New Haven 10, Conn.

SPECIFICATIONS OF THESE COLD-MIX PROCESSES AVAILABLE ON REQUEST

1—Penetration Macadam, 2—Open-Graded Plant Mix, 3—Open-Graded Road Mix, 4—Dense-Graded Plant Mix, 5—Dense-Graded Road Mix, 6—Mat Coat, 7—Seal Coat, 8—Sand Mix, 9—Sand Honing, 10—Patching, 11—Mastic-Mix, 12—Driveway Construction.

Bituminous Materials for Treatment and Patching in Virginia

Virginia offers bidders a choice within groups of materials. Importance of using hot, dry aggregates is stressed for patching work.

By S. V. Munsey

Maintenance Engineer, Virginia Department of Highways, Richmond

BITUMINOUS material for use in surface treatments and as patch material in Virginia is designated in accordance with Groups of Materials. The grouping is normally based on the use to be made of the materials rather than types of materials. In the interest of competition, the bidder is allowed to select the type of material to be supplied within the particular group. Each group will generally contain cut-back, emulsion and tar. Listed below are our normal standard groupings:

Group 1. Cold Bituminous Material — MC-1; AEM-1; RT-3 to RT-4.

Group 2. Cold Bituminous Material — RC-2; AEM-2, AE-2, AE-3, and/or AE-4; RT-5 to RT-6.

Group 3. Cold Bituminous Material — RC-3; AEM-3, AE-2 and/or AE-3; RT-6 to RT-7.

Group 4. Hot Bituminous Material — AP-00 and/or AP-0; RT-8 to RT-11.

Where two or more grades of bituminous material are shown under each type, the unit price bid on that grade shall apply to all the grades included in that type and the Department of Highways reserves the right to order whichever grade or grades is desired at the time. The exception to this rule is that in securing material for certain purposes the supplier is allowed to bid on AEM material only, or bids are taken on AEM material only in the emulsion group. The bidder is required to check the type of material on which bid is submitted.

Groups 1, 2 and 3 are used for prime, seal, straight and mixed-in-place treatments.

Group 4 is used for straight, seal, and penetration treatments.

It can be readily seen from this grouping that we would generally apply considerable quantities of emul-

sions inasmuch as the prices of the two materials are competitive. The AEM material is an inverted or immiscible emulsion very similar in its properties to the cut-backs. When the emulsion group is checked by the supplier this type of emulsion is normally specified for prime treatments and mixed-in-place treatments. The AE-2 is a quick setting emulsion and is normally specified for seal and straight treatments.

Factors in Selection

It is our opinion that, in general, comparable results are obtained from the various types of bituminous materials available. We likewise realize that certain variations in procedures are necessary in order to secure the best results from the several materials. For example, the heating tempera-

tures for emulsion (AE) are more critical as concerns foaming, whereas consideration must be given to the softening action of the solvent in the cut-back on old bituminous treatments. Quick setting emulsions will normally cure more quickly than cut-backs in hot, dry weather; however, some consideration must be given to the softer base asphalt used in the manufacture of emulsions (AE). This factor is advantageous where normal traffic density is anticipated, but on our most heavily traveled routes with a predominance of truck traffic, AEM is usually specified when the emulsion group has been selected by the supplier.

Due to other apparent demands, we have not received low bid prices from manufacturers of tar for several years. It is rather evident that this product is not competitive price-wise with the cut-backs and emulsions at this time.

In the interest of uniform pavement appearance, increased durability, and the ability to patch in all types of weather, considerable attention has been focused on the use of the newly developed portable bituminous patchers. It is our current practice to specify RC-2 in the cut-



● Mixed-in-place treatment in Virginia, consisting of 90 lb. per sq. yd. of 1/2-in.-max. aggregate and 6 percent AEM-2.



● Seal coat using .25 gal./sq. yd. of AE-2 and 22 lb./sq. yd. of 3/8-in. stone. Virginia engineers demand quick covering of quick setting emulsion. Note roller is at work while joint in other lane is being broomed prior to shooting.

back group and AEM-2 in the emulsion group for use in bituminous patching operations, and both materials have proven satisfactory for use in the portable patchers.

We have in use machines produced by several manufacturers, all of which perform a good job. We are, however, of the belief that the ability to dry the aggregate is essential, and simplicity of design and operation is most desirable. Hot, dry aggregate will produce a quick setting patch from a cold, easily handled bituminous material, since the heat of the aggregate is sufficient to drive off the solvent, of whatever type, from the bituminous material. The ability of these patchers to produce a workable and quick setting patch material at the point of need in any type of weather is a distinct advantage, to both the traveling public and the maintenance organization.

City curtails day-labor construction work

The City of Alexandria, Virginia, recently curtailed force-account construction operations, according to a report from The Associated General Contractors of America.

A survey of Alexandria municipal government operation was conducted by the University of Pennsylvania's Institute of Local and State Government for purposes of recommending organizational procedures and economies. One of the Institute's studies indicated the possibility of saving money by performing certain types of construction by contract rather than with the city's own labor forces.

Specifically analyzed in the study were the subdivision improvements operations of the city during the 1949-1953 period. The city has installed street, curb, and gutter improvements in new residential subdivisions, and then charged the builder its costs for this work. The analysis disclosed that the city had incurred approximately \$163,000 unreimbursed costs in performing nearly \$850,000 worth of such work during the five year period. This resulted from failure to include equipment depreciation and maintenance costs, workmen's compensation charges, and other indirect costs.

The results of the study led the City Council to the conclusion that contracts awarded through competitive bidding offer a means of effecting substantial savings in carrying out the city's public works program. In the future, curb, street and gutter paving, as well as sewerage works will be let to contract.

SEAL COATS WITH LATEX TESTED

Firestone Latex R-504 was used in this investigation. Following a simulated field service test in the laboratory, a road application was made. Advantage was shown for combining latex and asphalt by a dual spray bar technique, and the proposal is made to consider pressure feed rather than pump feed to the spray bar. R-504 shows definite apparent advantages in securing a durable seal.

By William H. Alcock

Research Engineer, Kentucky Research Foundation, University of Kentucky

A SEAL COAT, as the term applies to highway construction and maintenance, is a light surface treatment consisting of bituminous binder material covered with aggregate spread and rolled immediately after the binder has been sprayed. It is always placed on an existing surface or on a course serving temporarily as a surface. Purposes of a seal coat as generally stated are to:

1. Prevent entrance of moisture and air into the road surface.
2. Develop a surface texture more resistant to skidding than the existing surface.
3. Enliven an old dry or weathered surface with fresh bituminous binder.
4. Reinforce or build up (to a limited extent) a weak or inadequate pavement.
5. Improve the luminosity of the pavement or night-driving characteristics of the road.

6. Provide demarcation between road segments, especially between driving surface and paved shoulders.

Strictly speaking, the effectiveness of a seal treatment in satisfying those purposes is dependent upon the ability of the bituminous binder to adhere to the surface on which it is placed, and more so on its ability to form a bond with cover-aggregate placed over it. In brief, retention of aggregate on the road is a requisite of successful seal coating.

Naturally, there are several other attributes which the binder must have, such as a consistency which permits distribution in a thin film yet prevents undue penetration and softening of the existing surface. Likewise, it must possess an intrinsic cohesion within itself, in addition to the quality of adhesion to the other materials involved. Obviously, the desirable properties must be reasonably maintained

over a broad range of temperature and over a period of time extending into several years, if the binder is to be entirely satisfactory.

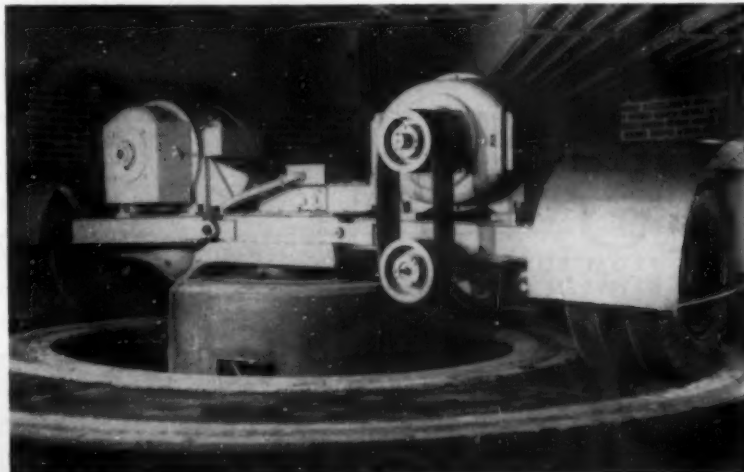
Investigations of rubberized asphalt paving mixtures* have shown that the qualities fundamental to good seal-coat binders are prominently displayed by combinations of asphalt and Firestone synthetic latex R-504 (laboratory designation 5714). On the basis of this evidence, a portion of a research program conducted under the auspices of Firestone by the Kentucky Research Foundation was devoted to studies of R-504 as an additive in rubberized seal-coat binders. As a corollary to this, methods and equipment for combining the asphalt and latex to their greatest advantage on the road also were studied.

*Gregg, L. E., and Alcock, W. H., "Investigations of Rubber Additives in Asphalt Paving Mixtures," Proceedings of the Association of Asphalt Paving Technologists, V. 23, PP. 28-63, 1954.

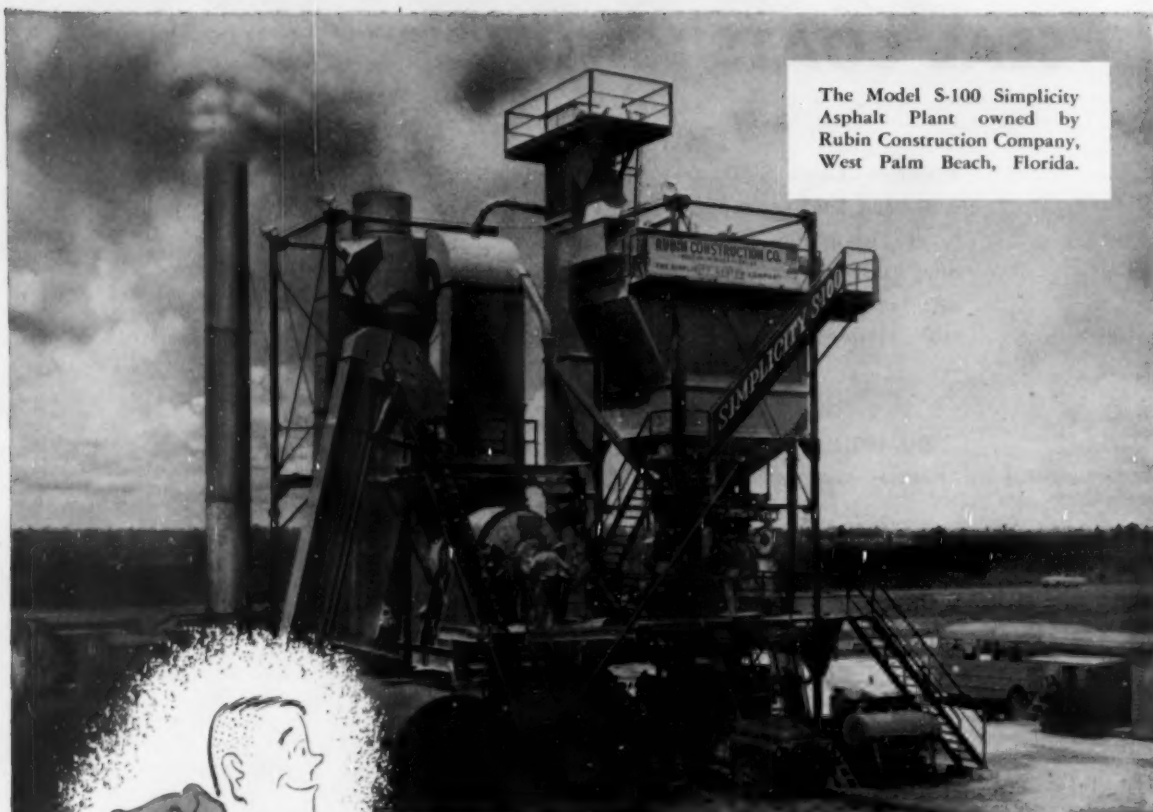
Preparatory to full-scale application of rubberized binders on a highway pavement, laboratory tests that would reflect field conditions were desirable. The usual limitations on laboratory tests for this purpose were recognized, so through a rental agreement with the Kentucky Department of Highways, use of the circular test track in the Highway Research Laboratory at the University of Kentucky was acquired by the Foundation. In this way simulated service tests were performed.

The track equipment, illustrated in Fig. 1, is located in a controlled temperature test room. For convenience of discussion, this equipment may be simply divided into two parts: first, the track or the circular surface on which the materials are placed to be tested and second, the rotor assembly which revolves around the track to simulate traffic.

The circular pavement is 2 ft. in width with inside and outside radii of 5 and 7 ft. respectively, and provides a test surface of approximately 8.5 sq. yd. The rotor is pivoted from the center pedestal by an off-centered cam which causes the axles of the rotor to alternately shorten and lengthen



● Figure 1. Circular track-rotor assembly used in simulated field test.



The Model S-100 Simplicity Asphalt Plant owned by Rubin Construction Company, West Palm Beach, Florida.



LOOK IT OVER BEFORE YOU BUY IT!

The Simplicity Model S-100 Asphalt Plant shown above looks good. But you can't tell about a plant from a picture. You should see the plant, inspect it and get reliable answers to your questions about it—from the men who operate and care for it.

Go to see every make of plant on the market and give them the same thorough analysis. Carefully compare them all. There are more asphalt plant manufacturers than automobile manufacturers. Ten in all from coast to coast.

IF YOU CAN FIND A BETTER ASPHALT PLANT THAN SIMPLICITY, BUY IT!

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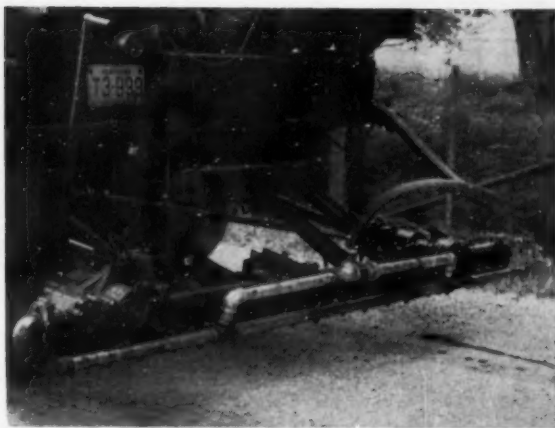
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See map, Simplicity plant 240, page 14



● Figure 2a. Latex spray bar assembly. Figure 2b. Latex motor-pump assembly.

the radii of their paths every 5 revolutions. This action causes the dual wheels to traverse the entire area of the track rather than to operate at a fixed perimeter, thus providing a fully realistic simulation of traffic on a highway surface.

The rotor is driven on one side by a 40 hp d.c. motor, and a d.c. generator of approximately equal weight is driven by the other axle. Although the motor may be operated independently, where severe testing is desired, the generator can be placed into the circuit in order to create a "drag" against one end of the rotor. Each half of the unit, coupled with the differential, the frame, and wheels, exerts a combined wheel-load of approximately 4000 lb. By varying the resistance in the circuit, speed of the rotor may be maintained from a minimum of 6 to a maximum of 30 mph.

The surface texture of the track pavement prior to application of seal coats was somewhat open graded as well as uncured; so, limestone dust was applied and subjected to wheel-traffic for a short period of time in order to dry the surface and to provide a smooth but closed appearance generally conformable to worn and aged pavements.

Three standard binder materials were used in the tests: an emulsified asphalt, a cut-back asphalt, and an asphaltic cement. After the track was divided into segments one square yard in area, each section was then individually sealed, stoned, and compacted. Usually, following the placement of each type of control section, an adjacent companion section was laid with the same binder to which was added 5 percent latex R-504 (expressed as weight of rubber solids as a percentage of the weight of bituminous material). It was noticed in combining the latex with both emulsified asphalt and with cut-back

asphalt that no increase in standard paving temperatures was required. However, to facilitate placement of asphaltic cement in combination with rubber, it was necessary to heat the blended materials to a temperature approaching 400°F. to achieve a uniform consistency.

The quantity of binder used throughout was 0.25 gal. per sq. yd.; and limestone chips, used as cover stone, were applied at a rate of 20 lb. per sq. yd. Binders and stone were applied by hand, followed by compaction with a 1.5 hp compactor.

After all the sections were completed, the surface was permitted to cure for a period of a week prior to testing.

The test consisted simply of subjecting the sections to simulated traffic, at a rate of 8 mph, until some sign of deterioration was noted. Periodically, the loose aggregate was broomed-off the track and a visual inspection of the quality of each section was made. A section was considered to have failed when the aggregate and binder had been worn away, exposing the pavement to such an extent that the seal could no longer be considered effective. Results were based on visual observations of the ability of each section to withstand the grinding, shoving, and pulling action of the wheels.

Only a few sections of each type binder were tested in this manner in an effort to compare the control, or plain, materials with the rubberized materials. Generally, the sections containing rubberized binder withstood these conditions longer than those with the control binders. Compatibility of the latex with the three types of binders was closely observed and possibilities for full scale application in the field were judged.

Inasmuch as the chemistry and stability of the combination of asphaltic

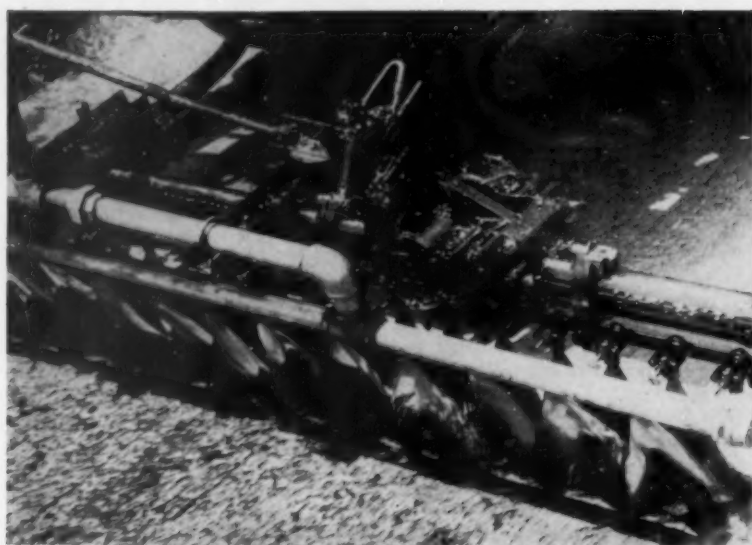
emulsions with latex emulsions have not been very thoroughly examined, and because the feasibility of mixing cut-back asphalts with latex had not been definitely established, it was decided to undertake a field project employing asphalt cement with latex.

Auxiliary Equipment for Pressure Distributor

On the basis of the desirable physical characteristics of the combination of 5% latex solids with hot asphaltic cement, it was evident that these materials should not be preblended. A converging spray technique was devised to permit handling of the two materials separately, yet provide for their blending into a suitable rubberized binder during the process of application. Advantages of such a method were visualized as:

1. The rubber was subjected to the least amount of degradation in its required processing.
2. Complete independence of materials was provided, and since danger of clogging within the asphalt pressure system was eliminated, greater flexibility was allowed for using any rubber content desired in combination with the asphalt.
3. Undesirable increases in temperature of the asphalt within the distributor could be avoided.
4. Additional processing otherwise required for making the combination was avoided.
5. Anti-foaming agents would not be needed in making the combination.
6. Optional use of latex in test sections within a seal coating project would be facilitated.

Preliminary laboratory tests with converging sprays of the two materials, delivered from hand operated pressure sprayers, showed that the desirable binder characteristics would be achieved in this manner. With this background, development of auxiliary



● Figure 3a. (Top): Application of rubber and asphalt. Figure 3b. (Bottom): Close-up of spray bar assembly showing blending of rubber and asphalt.

equipment that could be adapted to a pressure distributor was undertaken.

The latex spray bar, illustrated in Fig. 2a, was constructed from a 1½-in. water pipe. A length of 9½ ft. was chosen simply to accommodate single-lane coverage. To provide uniform spray distribution within the bar, feed lines were inserted at the quarter points, and fan-type spray nozzles were spaced on 6-in. centers. The latex bar was mounted about 12 in. behind the asphalt spray-bar by using two sections of channel and two U-bolts to hold it in place. Since all the spray nozzles were oriented to fan-out transversely across the lane, the latex spray-bar was tilted at an angle such that the latex intersprayed with the asphalt about 3-in. above the pavement surface.

The latex was supplied from a 55-gal. drum which was lashed to the side of the distributor. This quantity of material was sufficient for approximately 1800 ft. of application in a single lane with the latex solids being distributed at a rate of 5 per cent of the asphalt applied. The latex pump-assembly, as shown in position above the latex reservoir in Fig. 2b, consisted of a position displacement metering pump (1 gal. in 18 revolutions), coupled to a 2-hp gasoline engine. The quantity of latex to be delivered was directly controlled by the rpm of the pump, which in turn was governed by the rpm of the motor. On the test installations described later, a quantity of 36 gal. per min. and a pump rpm of approximately 650 was required.

The pump assembly was equipped with a by-pass system to provide safety against excessive back pressures, and to provide a means of starting the engine and pump without a clutch-type linkage. In this way, latex merely circulated through the system while the governor on the motor was being adjusted to the required rpm. The equipment was assembled, tested, and calibrated prior to installation on a distributor.

Application on Test Road

During the first week of August, 1954, the Foundation was granted permission by the Kentucky Department of Highways to experiment with latex rubber on a portion of a seal-coat overlay on Route U.S. 227 near Paris, Kentucky. Work on the project was conducted by Department of Maintenance employees with Department equipment. Specifications for the project called for a blend of refined and natural asphaltic cement, 200-300 penetration grade, to be distributed at a rate of 0.3 gal. per sq. yd. at a temperature of 325-350°F. The aggregate, a medium hard limestone with a nominal size of ½-in. to No. 16, was to be distributed through a spreader box at a rate of 20 lb. per sq. yd. and sealed by the combined use of a tandem and a three-wheel roller. These specifications, as described, were closely followed and standard paving techniques were maintained throughout the entire project. Even in the sections where rubber was used, there was no loss of time or deviation from normal practice necessary.

In distributing the rubberized binder, the pump was started recycling through the by-pass, then the rpm of the pump was adjusted to a specific rate to provide a known "Q". As the distributor moved along a lane of the pavement at its established speed, a quick-opening valve was released and the by-pass valve closed, interspraying the latex into the asphalt. The stoning and rolling operations followed as in normal practice. A pictorial sequence of the complete operation is shown in Figs. 3 and 4.

The first of two such rubberized sections was placed at a point two miles west of Paris in the east-bound lane, and extended for a distance of 500 ft. The second section was placed in the south-bound lane 6 miles east of Paris and extended for about 1000 ft. The latex solids in both sections was incorporated at a rate of 5 per cent of the asphalt applied. With the exception of some minor clogging of the pump, no difficulty was encountered in the operational procedures.

Immediately after completing the project, the pavement was inspected, and there was no visible distinction between the rubberized and non-rubberized sections. However, when attempts were made to pry pieces of aggregate from the surface, the rubberized binder offered much greater resistance than the control material. An indication of the tenacity with which the aggregate was held by the rubberized binder is shown in Fig. 9.

Inspection and Evaluation

To properly evaluate the merits of the rubber-asphalt seal coat installations, periodical inspections were made and the pavements photographed to provide permanent records of their performance.

Location No. 1. The over-all performance of the non-rubberized seal coat placed at this location has been very poor. A large part of the aggregate was loosened by traffic within the first few days of service. Probably this could be attributed to the fact that the cover stone was very wet when placed. Although the same stone was placed on the rubberized section, loss of aggregate from this portion has been relatively slight. After only a few days of service a marked contrast between the rubberized and non-rubberized sections was evident. To illustrate this contrast, photographs were taken of the same section of pavement at different time intervals after construction.

The photographs in Fig. 5 show adjacent rubberized and non-rubberized sections immediately after construction, and after almost two months service. In this latter photograph it is quite apparent that the rubberized section in the right lane has much better retention of aggregate than the control material in the left lane. After 4 months service, as evidenced in Fig. 6, and the close-up view of Fig. 7, the control section has lost practically all of its cover stone while the rubber section was essentially intact. Recent inspection has shown no evidence of change in the surface.

Aside from the exceptional tenacity exhibited by the rubberized asphalt as indicated by fibrous strands, a logical explanation of the superiority is that the binder has a better adhesion to the aggregate than non-rubberized asphalt. The rubberized binder material coated the aggregate more thoroughly and the greater adhesion between the binder and stone resulted in a wear surface with superior resistance to traffic.

Location No. 2. While the pavement at Location No. 1 has displayed a marked contrast between the rubberized and control sections, both

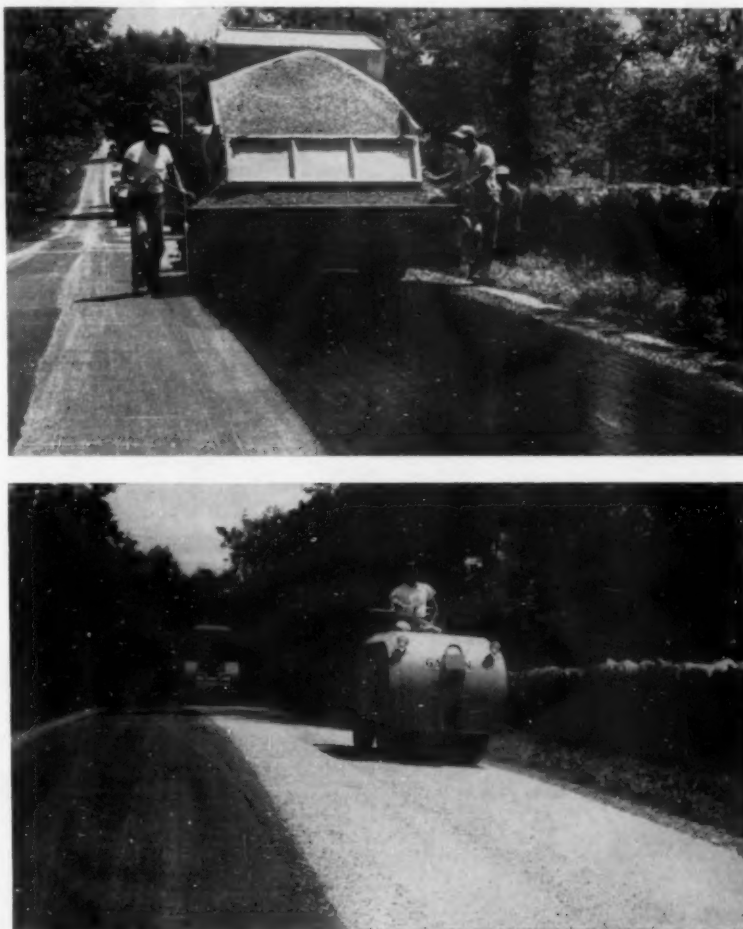
types of binder at Location No. 2 have shown excellent performance. It should be noted that in this location both aggregate and pavement had been dry several days prior to the seal coating. Evidence of the excellent aggregate retention in both the rubberized and the control section is outstanding in Figs. 8, 9, and 10. The well defined aggregate texture of the surface after 2 weeks and 4 months of service is equally applicable to the rubberized and non-rubberized sections. A significant contrast can be noted, however, in the effort required to dislodge an aggregate particle from each of the surfaces, and also in the "extensibility" of the rubberized binder illustrated in Fig. 9. The same tendency to withstand elongation was exhibited by the rubberized asphalt even at temperatures of 32°F., five months after application.

The positive-displacement-type pump used in this field investigation, although adequate for placement of

short test sections, was not completely satisfactory because some clogging of the pump was observed toward the end of each application of rubberized binder.

It should be expected, however, that practically any pump of this type will undoubtedly have very small clearances, which will in a matter of time tend to break the emulsified materials. With this in mind and also giving some thought toward future projects, it is now proposed to force the latex from a reservoir by a pressure system rather than resorting to the use of a pump of any kind. To accomplish this requires the following equipment: A compressed gas cylinder, a pressure regulating valve, and a latex reservoir with a pressure gage. A sketch of this proposed latex distribution assembly in position on an asphalt distributor is illustrated in Fig. 11.

By calibrating this entire system under various pressure heads, a specific "Q" (flow quantity) may be de-



● Figure 4a. (Top): Application of cover stone. Figure 4b. (Bottom): Rolling of cover stone.



● Figure 5a. (Left): Test road, one day after sealing. Figure 5b (Right): Appearance of seal coat at location No. 1, seven days after construction. Rubberized binder on the right.



● Figure 6. (Left): Location No. 1 at age 4 months. Figure 7 (Right): Close-up of pavement in Figure 6.

terminated for each increment of pressure. In this manner, assurance of an established rubber-asphalt blend can be obtained without unnecessary delay and with less maintenance on the metering equipment. Operational

procedures simply require a pressure-setting on the latex chamber to give a desired "Q", and then releasing a quick-acting gate valve concurrently with the release of the asphalt. By placing this valve near the dis-

tributor operator where he can conveniently control both asphalt and latex distribution, no additional manpower would be required.

Assuming that an inexpensive insert gas such as nitrogen is employed, one cylinder of 225 cu. ft. at 2200 psi. (70°F.) would be capable of distributing five 100-gal. tanks of latex at a cost of approximately \$6.00, or \$1.20 per 100 gal. Since each 100 gal. of latex would be adequate for 1000 gal. of asphalt, the normal capacity of the distributor, one cylinder of gas could capably supply latex for five distributor loads of asphalt provided conditions of distribution were ideal.

This method, as proposed, should work adequately for full scale projects as well as on short test installations. However, if it is desired to lay very short sections only, both the compressed gas and latex containers could possibly be reduced in size more commensurate with requirements of the project. It is expected that the over-all operating expenses would be considerably less in using this system rather than the positive-type metering pump; however, until this equipment has been assembled



● Figure 8. Location No. 2, with rubberized binder in the left lane beginning at the white transverse line. Age, 4 months.



● Figure 9. (Left): Surface texture in the rubberized portion of location No. 2 Age, 2 weeks. Figure 10. (Right): Surface texture of pavement shown in Figure 9. Age, 4 months.

and proven, its mechanical and economic advantages cannot be definitely established.

Conclusions

The dual-spray method of combining rubber and asphalt proved quite effective and provided several advantages which could not have resulted from combining the materials within

the distributor. The fact that this method allowed a controlled proportion of latex and asphalt to be intimately dispersed while being intersprayed, is in itself quite significant, and as a result of this faculty, resilient and adhesive properties were imparted to the asphalt.

The positive metering system for distributing the latex proved to be

adequate only for short test sections, because milling of the latex within the pump inadvertently caused some breakdown of the emulsion which resulted in reduced efficiency of the system. The proposed pressure distribution system should eliminate this milling of the latex and tend to be more mechanically and economically advantageous.

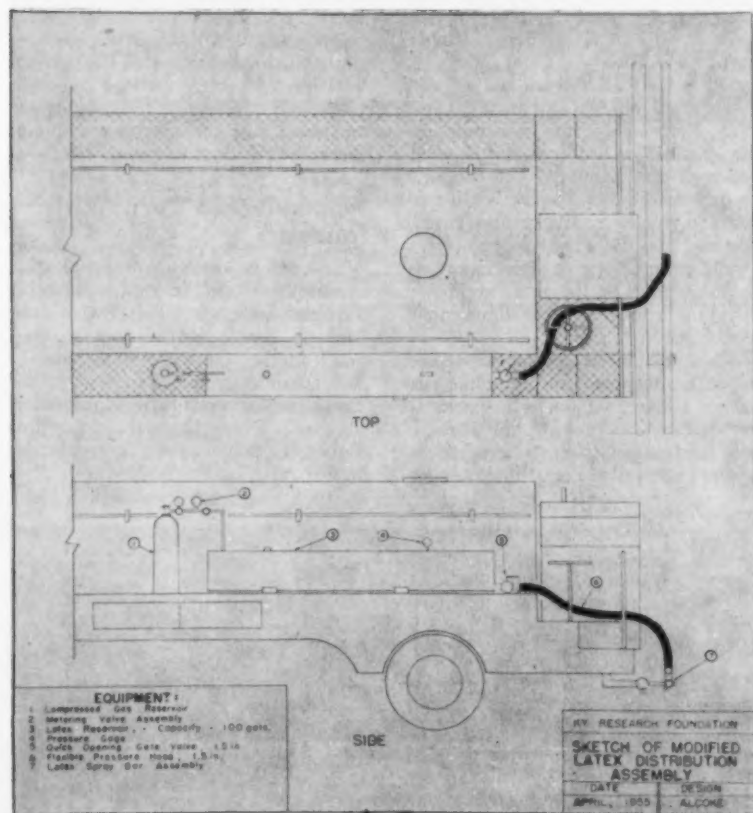
From the standpoint of comparing binder materials, within the limitations of these field tests, it can be said that frequent inspection of the project has shown consistently that the rubberized binder offers far greater resistance to loosening of the aggregate than the corresponding non-rubberized binder. There can be little doubt that the rubber strands, so evident upon prying an aggregate out of the pavement, contribute appreciable to this phenomena.

Ultimate Objective

The ultimate objective of field testing is, of course, to confirm indications of favorable performance that have been developed through laboratory studies. With every indication that the advantages presently recognized and described should continue with age and service, it appears that performance of seal coats can be enhanced, particularly under adverse conditions at the time of placement, by the addition of Firestone Latex R-504.

Traffic paint test

The durability of traffic line paint against wearing away under traffic is being tested in New York City by a color-photographic method. City traffic engineers have used this visual means of comparing three commercially available paints on test installations of one of the city's large bridges.



● Figure 11. Proposed latex distribution assembly.

VIEWS AND COMMENTS

By H. G. Nevitt

THE A. A. P. T.

Highway work is placed in the field of civil engineering. Certainly no other group can better claim it. Yet understanding of certain phases lies in the domain of physical chemistry, and progress in moisture control, soil stabilization, and similar matters will require real understanding of this science. As a matter of fact, highway pavement design theory today involves structural mechanics beyond the point understood by the usual engineering graduate, including the complex field of elastic-plastic deformations, along with a smattering of advanced physics; while the practical phases of the art have become so specialized that the practitioners in this line of engineering work have only a token acquaintance with the practices in most other branches. There are of course certain obvious exceptions; the bridge men must follow general developments in structures, and soil mechanics is important in several fields. However, highway problems are sufficiently numerous and varied, and their economic importance so great, as to constitute a separate field of knowledge.

To a lesser degree the same statements apply to the specialized techniques required in bituminous construction. This of course does not mean that engineers specializing in these fields can afford to neglect general scientific and engineering progress. We have had frequent occasion to remark that the basic analysis required to solve some highway problem had been rather thoroughly worked out in some other field of engineering; the art of drying is a ready example. At the same time, each of us must concentrate on his particular needs.

Formation

In recognition of this situation, the Association of Asphalt Paving Technologists was formed by a small group of men a few decades ago. It has grown tremendously since, partly with increasing interest in the field, partly because of the devoted efforts of its officers and directors over the years. Its appeal is to many sorts — engineers, chemists, contractors, practical road builders, and suppliers — with a

genuine interest in advancing the art of building better asphalt roads. A professional group, each member of which is elected by the Board of Directors after considering his individual qualifications in the field of asphalt paving technology and with no association with either commercial or government interests, it welcomes — from members and non-members alike — contributions (in the form of papers or discussion) at its meetings or in its proceedings. The only requirements are that these be informative, objective, free from any tinge of self-interest or propaganda, and likely to lead to betterments in its field of interest.

Forums — Advancements

Its well-attended meetings are becoming increasingly the forum for advancements in asphalt paving technology or associated matters. Yet the membership comprises a surprisingly small proportion of those now engaged in this line of work and eligible by its reasonable requirements to belong. Fortunately, the demands on the Association are few and it need not seek out members. Yet progress in their chosen life work would undoubtedly accompany greater membership, and its scientific objectives would be benefitted by wider participation as well as the more complete distribution of its proceedings that would result.

Those readers desirous of participating in the technical and scientific advances in this field, and who (regardless of early background or training) now hold responsible positions which concern some phase of asphalt paving

construction, might find it well worthwhile to consider the possibility of membership.

We have long been impressed by the strides taken in the progress of asphalt paving construction towards a rational engineering science, and the aid given this by the Association. We are consequently pleased to have been given the privilege of aiding in the direction of its affairs for this year. However, we feel that the advances to date will appear almost insignificant compared to those we anticipate in another few decades, both in their attack on the basic problems confronting the art and in the volume of detailed knowledge which will be required to overcome every difficulty which we have seen or will appear. In these years ahead the work of the AAPT as well as the need for its activities will loom increasingly larger. We are sure that the present membership will do its share of the job in fine shape; we hope that the responsible men in this whole field will more and more feel the need for aligning themselves with this group.

Pennsylvania Turnpike lauded

The 44% reduction in traffic deaths accomplished on the Pennsylvania Turnpike system in 1954 (ROADS AND STREETS, April) has won commendation from the National Safety Council. In a communication addressed to the Turnpike Commission Chairman Thomas J. Evans, Council officials described the achievement as "outstanding."



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Can Density and Stability Tests Be Matched With Service Behavior?

No conclusions are yet warranted, according to a Highway Research Board committee progress report, here summarized

IT IS axiomatic that in a broad sense the essential purpose for testing bituminous-paving mixtures in the laboratory is to predict or explain the service behavior of highway surfaces composed of these mixtures. A necessary function of research, therefore, is the correlation of laboratory testing with actual pavement performance.

The two properties that most-greatly affect the performance of these mixtures in road surfaces are (1) stability and (2) durability. Stability of a paving mixture is defined as its ability to resist permanent deformation under the moving or stationary wheels of traffic vehicles. Durability of the mixture is defined as its ability to resist adverse effects of such natural elements as water, air, and sunlight and of such mechanical forces as the wearing or abrading action of moving wheels.

From time to time, and especially in recent years, various laboratory tests have been devised to measure these two fundamental properties. A number of tests in use today were designed to measure the property of stability as previously defined; these include the Hubbard-Field, Marshall, Skidmore shear, Campen bearing, unconfined compression, Hveem stabilometer and several varieties of triaxial-compression tests. To determine whether stability of the mixture as evaluated by these methods can be correlated with performance of the pavement under traffic is one of the primary aims of this committee.

All of these tests measure certain resistance properties of bituminous mixtures in various ways and in varying degrees. According to advocates of the several tests, each has certain advantages. Likewise, each may be said to have disadvantages or even, in some cases, objectionable features.

Editor's Note: **ROADS AND STREETS** gives this additional publicity to Highway Research Board Correlation Circular 273, entitled "First Progress Report of Committee on Correlation of Density and Stability Test of Bituminous Mixtures with Service Behavior," Harry M. Rex, chairman. This report includes tables of data and an appendix reviewing procedures used in several of the laboratories which participated in the study.

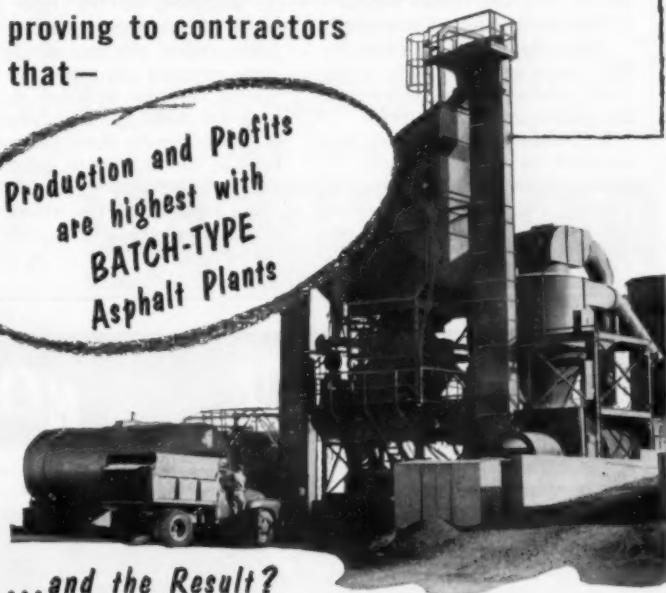
The shortcoming common to all of the stability tests is the lack of clear-

cut relation between the criteria set up for the tests of the mixture and the success or failure of the pavement.

Tests to measure durability of bituminous mixtures are not so numerous as the stability tests, although

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It seems clear that before correlation of tests for density of a bituminous pavement with observed pavement behavior can proceed, some agreement must be reached with respect to the most-reasonable and most-realistic method for computing the maximum theoretical specific-gravity value for the mixture of which the pavement is composed. It is believed that the current co-operative study will lead to better understanding of the usefulness of the various existing specific-gravity methods and may even point to selection of a test procedure satisfying to all concerned.

The following comments on the work done in the 1949-1950 work and on the test results obtained in that study appear warranted:

1. Results of gradation tests for the various aggregate components show good agreement as between the participating laboratories

2. Satisfactory agreement was observed in the test results for the several samples of asphalt cement. The few deviations that did occur would probably not affect stability or density values

found for corresponding samples.

3. Density values for the several bituminous mixtures compacted in the cooperating laboratories using various types of compaction differed considerably. The magnitude of the range of values emphasizes the need for correlating laboratory-compaction procedures with density data from the field.

4. While in some cases individual cooperators evaluated the mixtures in terms of criteria which they had themselves adopted for the several test methods, there had been no agreement by the committee with respect to these critical values prior to making the tests. The test results, therefore, are of interest chiefly as indicative of the type and range of values that may be expected when mixtures similar to those reported are tested by the several methods included in the program. Although interpretation of these results does not seem feasible, the experience gained in this first testing program should prove valuable to the committee in carrying on future stability testing.

tests have been developed to measure resistance to water action and abrasion. Scarcity of tests on the mixture in its entirety should not be construed as indicating complete lack of information bearing on durability properties. On the contrary, knowing that certain properties of the bituminous material have a direct relation to the durability of the whole mixture, a number of laboratory tests have been developed to evaluate the binders with respect to these significant properties. Typical examples are: the thin-film oven test, the Oliensis spot test, the California abrasion test, and many types of film-stripping tests.

Density Test Common

One of the tests commonly made on compacted bituminous mixtures is the density test. Many specifications employ density tests in the delineation of the end point of compaction during construction of the pavement; other specifications do not. Many mixture-design methods include as criteria such items as percent of voids in the compacted mineral aggregate filled with asphalt, and percent of residual air voids in the entire mixture when compacted. All of these criteria require some sort of density determination.



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There is general agreement that for a given aggregate, the higher the density of the aggregate combination and the higher the asphalt content, the greater resistance to age hardening and to adverse effects of water. While it is also generally agreed that residual air-void content in the compacted pavement is of itself no criterion of stability, there is, at the same time, some difference of opinion with respect to the existence of a relation between density of the mineral aggregate in a compacted bituminous mixture and resistance of the pavement to deformation under load.

Committee A-5 of the Highway Research Board was organized in 1947 to supply information leading to the correlation of tests measuring these two properties of compacted bituminous mixtures, stability and density, with the service behavior of pavements composed of such mixtures. Although, as just pointed out, opinions differ as to the existence of a relation between density of a mixture and its stability, it should be borne in mind that what is sought by this committee is a correlation of stability tests with certain aspects of service behavior and a correlation of density tests with certain aspects of service behavior. In the work of the committee to date, more emphasis has been placed on the tests for stability, with tests for density receiving incidental consideration only.

Began in 1950

In 1949 and 1950, a series of cooperative tests was made by laboratories represented by members of the committee under the leadership of Keith Boyd and George Swatek, successive chairmen of this committee during that period. Road surfaces of three state highways and one section of a full-scale test track were used in the correlation studies. Of these four field surfaces, only two were constructed at about the same time that the cooperative tests were made. In these two cases, complete assurance was had that the same aggregates and asphalts were used in both the laboratory and in the field. Of the other two field surfaces, one had been in service for 2 years previous to the testing program and the other for 5 years. Consequently, in these latter cases, the materials available for the cooperative testing could only be identified as being similar to those used in the field construction.

Stability test methods used in the program included the following: Hubbard-Field (modified), unconfined compression, Marshall, triaxial (in-

(Continued on page 159)

OVERMAN STONE AND BITUMINOUS SPREADER



They Use 'Em Everywhere!

... **MR. PAVING CONTRACTOR** — if you are adding to, or replacing, your paving equipment, the OVERMAN SPREADER is the one for you. Its low cost, operating speed and economy, and ability to handle ANY job assures you of increased efficiency and more profit on every paving contract.

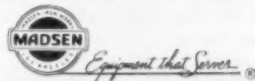
Yes, this IS the paver for you.

WRITE
FOR
BULLETIN
TODAY

I. J. Overman Mfg. Co.
BOX 203 MARION, IND.

... for more details circle 225, page 16

REACH A NEW PEAK IN MIXING SPEED WITH THE

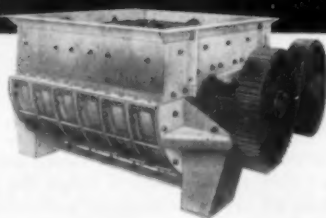


The industry's most advanced engineering makes the MADSEN Model 440 Twin-Shaft Pug Mill Mixer the leader in fast-mixing ability. The many outstanding features of this mixer assure the user of a discharge time of approximately 4 seconds regardless of batch size. Every asphalt plant owner knows that a fast charge-mix-discharge cycle means greater hourly production and more profits. That's why more and more asphalt plant owners depend on the MADSEN Twin-Shaft Pug Mill Mixer ... to step up their mixing speed and their profits!

MADSEN TWIN-SHAFT PUG MILL MIXER IS FASTER BECAUSE ...

- It features pressure mixing, obtained through the paddle arrangement which is thorough and fast.
- The mixer contour and the MADSEN patented shank design help to provide the ultimate in fast-mixing action.
- The extra-large discharge gate, air-operated, speeds the discharge from mixer to truck.
- The MADSEN Asphalt Pressure Injection System (an optional extra) pumps the asphalt into the mill in 5 to 7 seconds!

MADSEN Twin Shaft PUG MILL MIXER



MADSEN Model 440 Twin-Shaft Pug Mill Mixers are available in 4000-lb., 5000-lb. and 6000-lb. capacities to meet your requirements. For complete engineering data write for Bulletin No. 400.



MADSEN WORKS

CONSTRUCTION EQUIPMENT DIVISION

Division of Baldwin-Lima-Hamilton Corporation

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... for more details circle 230, page 16

Electronic Bin-Level Indicators for Asphalt Plant Operators



● Four dials, one for each bin, helps operator keep constant check on bin operation.

AN easily installed electronic instrument has solved a tricky problem that has plagued asphalt mixing plant operators. Although employed in dozens of other U.S. industries, the unit only recently has been applied to asphalt mixing.

At a pilot installation made during 1953 near New York City, this instrument, called the Telstor, has given continuous indication of the level of dried (or stone and sand) aggregates at a convenient location on the ground. The plant is that of Crampton Brothers, located in Great Neck, Long Island. The installations here eliminates the necessity for a plant worker to climb a precarious steel ladder, often as high as 50 ft., to check the level of material in four towering bins. Three of these bins contain respectively the hot, dried sand, $\frac{1}{2}$ -in. and $\frac{3}{4}$ -in. stone employed in the production of

most asphalt mixes. Oversized pieces of stone are stored in the fourth bin.

Before the installation, a plant operating at full production required that a worker scurry up the ladder about every half hour to check bin levels. This tended to slow down production, added to manufacturing costs, and presented a safety hazard.

Constant awareness of levels within the four bins was considered important for three reasons. First, for efficient production, exact quantities of the various stone and sand ingredients must be available in the bins at all times. Second, if one of the bins overflows, the screening device at the top of the hoppers would fail to operate and serious damage to the shaker screen and bucket conveyor might occur. Third, adequate material in the bins insures better quality mix.

Some newer asphalt mixing plants

have overflow pipes at the top of the bins, but these are partially effective, indicating only the overflow point within the bins. Also, these overflow vents may become blocked or jammed by emeshed particles.

Crampton Brothers purchased an installation of four continuous level indicators. The installation was relatively simple consisting of a 10-ft. "electrode" extending vertically into each of the four bins and supported at the top by porcelain insulators. An electrode is the sensing element which relays information to the Telstor on the level of the material being measured. Standard $\frac{1}{2}$ -in. pipe was employed as the electrode because it provided a rugged and low cost replacement for the only part of the equipment which was subject to wear.

Four instrument units, one for each bin, were mounted nearby and four meters were situated strategically at ground level where an operator feeding raw material into the plant could keep a constant check.

The instruments operate on a capacitance principle and contain no moving parts such as floats, diaphragms or rotating paddles to stick, clog or bridge over. Electronically, the instruments are relatively simple, employing only one easily-replaced radio tube which can be purchased in any radio store. The electronic units indicate level due to the aggregate surrounding the electrode thereby increasing the capacitance at the electrode. The instruments being of the capacitance type do not rely on the electrical conductivity of the material contained in the bin.

**YOU CAN SAVE THE ENTIRE COST OF A
SIMPLICITY ASPHALT STORAGE AND SUPPLY
SYSTEM IF YOU SAVE EVEN A FEW DAYS
DELAY ON A LARGE PAVING PROJECT**

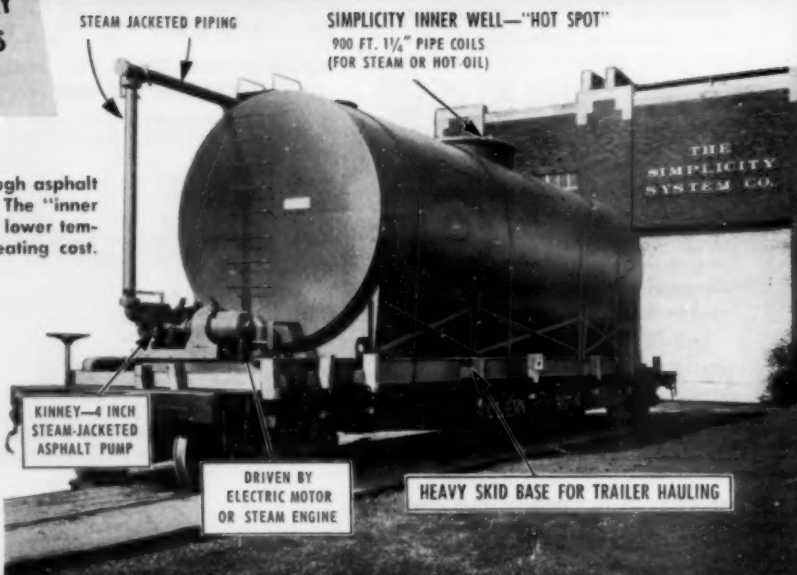
SIMPLICITY TANKS (with "Hot Well") keep only enough asphalt heated to required temperature to supply the plant. The "inner well" is insulated by the larger quantity of asphalt at lower temperature in the "outer tank." This saves much in heating cost. For larger storage tanks, up to 400,000 gallons, Simplicity offers its Portable Vertical-Type Tank, also with the "Hot Well."

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... for more details circle 257, page 16

SIMPLICITY HORIZONTAL ASPHALT STORAGE TANK 18,500 GALLON CAPACITY



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SIMPLICITY INNER WELL—"HOT SPOT"
900 FT. $1\frac{1}{4}$ " PIPE COILS
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STEAM-JACKETED
ASPHALT PUMP

DRIVEN BY
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OR STEAM ENGINE

HEAVY SKID BASE FOR TRAILER HAULING

THE
SIMPLICITY
SYSTEM CO.

New Equipment and Literature

(Other Items Pages 124-135)

Asphalt Maintenance Machine

A new asphalt maintenance machine designed and built by Buhl Machine Works, Buhl, Idaho, is claimed to embody a somewhat new principle in asphalt maintenance. This machine works equally well winter or summer, wet weather or dry.

The O'Hadi Patcher is a small, low cost, individual machine. It sets over the hole and heats the batch and the hole simultaneously. The manufacturer contends that it is as necessary to heat the hole as it is the batch. And that the hole be heated without burning or charring. This machine also has a built in shear plate, that smooths and levels the patch while it is hot.



The O'Hadi Patcher

For more information circle 157 on Service Coupon Page 16 and mail now.

Asphalt and Tar Heating Kettle

A new unit in its line of asphalt and tar heating kettles, Model F-7, has been announced by the White Manufacturing Co., Elkhart, Ind.

The Model F-7 is mounted on 4 pneumatic tired wheels, in distinction to the 2-wheel units also produced. It has 325 gal. capacity, 2 White Kerosene burners, 20 gal. fuel tank. Propane burners are optional.

As on other White kettles, Model F-7 is regularly furnished with fireproof top, especially valuable when used to heat cut-back and other highly inflammable bituminous materials. If desired, F-7 can be supplied with hinged top, or with warming hood for an extra barrel.

This, and other White kettles, can be



Model F-7 Asphalt and Tar Heating Kettle

equipped with hand or engine driven spray pump, with flexible metal or rubber steam hose, and spray bar with insulated handle. Dial type direct-reading thermometers are supplied. Hand or power agitators are also available.

Model F-7 weighs 2175 lb. It is mounted on semi-elliptic springs and four 6.50 x 16 — 6 ply tires on Timken bearing steel wheels.

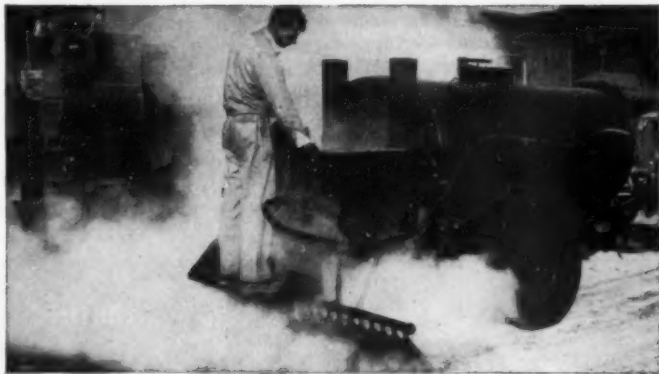
For more information circle 158 on Service Coupon Page 16 and mail now.

Protective for Bituminous Pavements

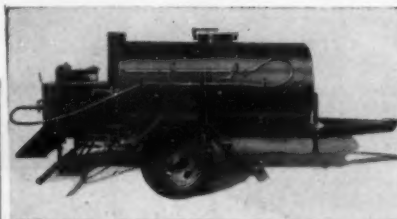
A new technical bulletin issued by Maintenance Inc., Wooster, O., describes the use of Jennite J-16 for protecting and preserving asphalt and black top pavements. J-16 is applied in a liquid coating over new or old surfaces to form an attractive, waterproof finish. It is said to protect against frost damage, abrasion, oxidation, solvent action of gasoline and oil and the drying effects of the sun. J-16 is recommended for use on driveways, roads, parking lots, loading docks and traffic aisles.

For more information circle 159 on Service Coupon Page 16 and mail now.

STANDARD STEEL "S-J" Maintenance Distributor



for VERSATILITY — EFFICIENCY — ECONOMY



HANDLES ASPHALT OR
TAR—FOR PATCHING—
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WORKS FAST—FAR AHEAD OF THE GRAVEL GANG

Standard Steel S-J Maintenance Distributor, designed specifically for jobs where the use of bigger equipment is costly and impractical. can be moved rapidly from one location to another for patching, shoulder repair or construction of secondary roads . . . It is equipped with suck back spray bar which permits closing of the discharge valve and pulling back all surplus material in the spray bar and piping for quick cleaning . . . All piping and valves are flanged to permit easy repair or replacement . . . The draw off valve is on curb side for safety . . . and coilless self-generating burners are standard equipment as well as a Viking special asphalt pump which can be completely drained, eliminating the necessity for thawing when the unit is started cold. Write for complete details on the 1955 Model S-J.

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Standard Steel Works NORTH KANSAS CITY, MO., U.S.A.

S37



● Spreading base stone for street work at Perry, N.Y. Cipriano Gravel Co., contractor.

Small spreader shows versatility for street paving

For all kinds of paving other than the big jobs, a junior-size spreader has proved a top performer for Cipriano Gravel Company of Mt. Morris, N.Y., according to Charles Cipriano of that company.

In the past year the company has used an Adnun Jr. 8 unit on a variety of jobs too big for the ordinary hopper on wheels, yet too small to be

done economically with the big self-propelled machines. The contractor has also used the unit in paving parking lots, large patching jobs, driveways, gas station aprons, cemetery roads, siding, smaller city street jobs, and inside-the-building asphalt paving work.

On a recent street paving job in Perry, N.Y., the Cipriano firm used the spreader to lay base courses and pave four street sections, each 24 ft. wide by approximately 1,400 ft. long.

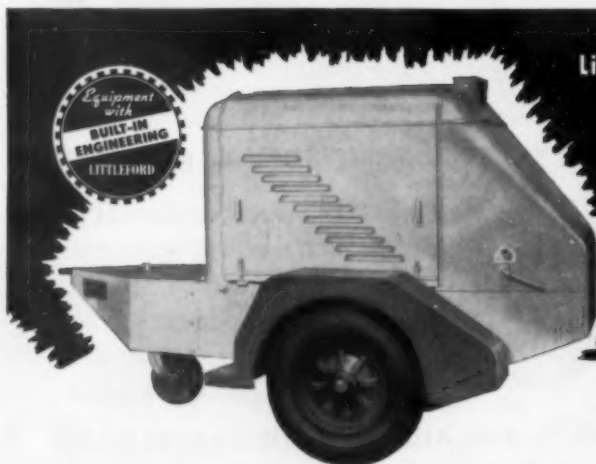
Using this machine it took three days for each street.

On the first day 270 tons of stone to form a 3-in. layer over an 8 to 10-in. gravel course was spread with the machine. This base was penetrated with oil. On the second day a 1½-in. base of colprovia was laid and compressed. Some 170 tons of material was used for this course.

On the third day the machine was used to place a 1-in. topping of colprovia. While this material is very hard to handle, because it doesn't run down into the raker bars like black-top, Mr. Cipriano said. The machine does a good job of spreading it.

The "Junior 8" has dual controls, and rubber wheel traction to eliminate crawler complications. It is equipped with a rotating raker bar and an oscillating screed with overlapping action at the joint. The machine couples to a truck, has a self-equalizing tow hitch, and needs no trailer for transport.

● CHARLES V. OWEN is appointed Field Engineer for The Asphalt Institute. He will cover Kansas and Nebraska as an area engineer under District Engineer Merritt R. Boyer, Kansas City.



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LITTLEFORD

LITTLEFORD BROS., INC.

454 E. Pearl St., Cincinnati 2, Ohio

. . . for more details circle 222, page 16

ROADS AND STREETS, July, 1955

Density vs. Stability

(Continued from page 155)

duced lateral pressures), triaxial (applied lateral pressures), Sohio flexure (beam), and Hveem test. These tests were made on mixtures prepared in the laboratory by each of the several cooperators using aggregates and asphalts typical of or identical with those used in the field construction.

In preparing the test mixtures, a number of the cooperators used a range of asphalt contents in addition to the single percentage of asphalt used in the actual pavement construction. The purpose of this procedure, of course, was to evaluate the several test methods with respect to their ability to indicate an optimum asphalt content. While information developed in this manner undoubtedly added to the general interest of the early committee work, it is the present sense of the committee that procedures leading to the development of optimum asphalt contents belong more properly in the field of design and that the mixtures used in the laboratory portion of our future correlation studies should be as nearly as possible the same as found in the field, including the asphalt content.

No Conclusions As Yet

Results of the laboratory tests made by the cooperators to date, together with other pertinent data, are given in the tables and the appendix. All of these data were compiled in somewhat different form in 1952, with distribution limited to the committee membership. The present report does not include analysis or interpretation of the data, and statement of even tentative conclusions with respect to the objectives of the committee does not seem feasible at this time.

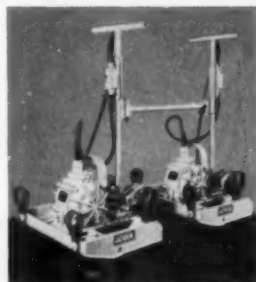
It is the present feeling of the committee, however, that the available information should be publicized at this time, if only in the form of a progress report. It is true that many of the test results of the work thus far are characterized by inconsistencies and lack of relation either as between test methods or as between any of the test methods and reported pavement performance. At the same time, recognition of these disparities is of value in indicating the magnitude of the task confronting the committee and in giving direction to its future activities. As an example of the latter, the committee is even now engaged in an extensive program of cooperative testing, the purpose of which is to compare several methods for obtaining effective and rational maximum specific-gravity values for mixtures of mineral aggregate and asphalt.



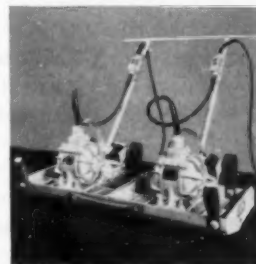
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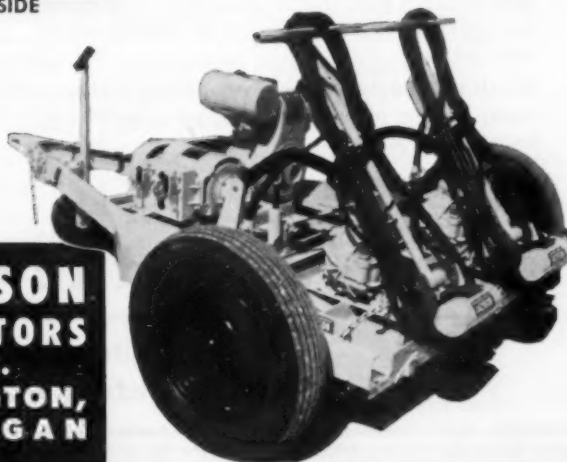


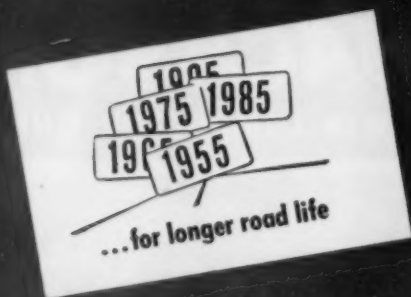
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... for more details circle 227, page 16

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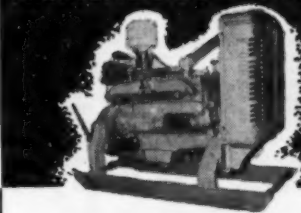
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| 1—Littleford Steam Generator Mounted on Trailer, KWIK 3,000 gal-lon capacity | 4,000.00 |
| 1—ID9 Diesel International Wheel Tractor with Front End Loader Attachment | 2,250.00 |
| 1—International Vibro-Tamper, 1 year old. | 8,500.00 |

All of the above machines are in excellent condition

VILBRO EQUIPMENT COMPANY

233 North Avenue

Telephone: WEstfield 2-4400

Westfield, N.J.

FOR SALE

1954 — 5 1/2-yd Rex Transient Mixer mounted on 1952 International series L 190. 10 — 1000x20 14-ply tires, 80% rubber. Lights, vacuum brakes, heater, dual axle. color red. All in very good condition.

5-yd. Smith Transient Mixer, mounted on 1950 International Truck series L 190. Drum and motor in fair shape. Vacuum brakes, lights, motor, and heater all in good condition. Dual axle, color red. 10 — 1000x20 14-ply tires, 80% rubber.

4-yd. Smith Transient Mixer mounted on a series F 7 Ford, with 10 — 900x20 tires, 80% rubber, dual axle, lights, heater, vacuum brakes. Drum and motor in good condition.

3-yd. Smith Transient Mixer mounted on 1945 Studebaker 6x6 army truck with 10 — 825x20 tires, 50% rubber. Lights, brakes good. Motor, mixer, and truck in fair condition.

2-yd. Smith Transient Mixer with motor in good shape. Not mounted.

All of these units are good buys
We also have the following new truck tires:

- 11— 825 x 20 12-ply tires
- 9— 1000 x 20 12-ply tires
- 10— 900 x 20 12-ply tires

Ubbink Fuel & Dock Co.
Port Washington, Wis.

3—10"x20" Champion Jaw Crushers.

1—Austin-Western Portable Plant — 10" x 16" overhead eccentric Jaw Crusher, driven by 6 cylinder I.H. Gasoline Engine. Steel frame, wheels and draw bar.

1—Complete "Pioneer" Cinder or Slag Crushing and Screening Plant — 10"x20" crusher, 40"x22" rolls, D.D. 4'x12" screen, 4 belt conveyors, bucket elevator, two bins. All motors & drives. Near Philadelphia.

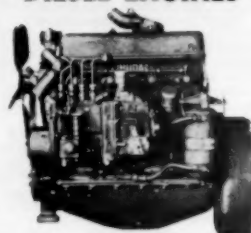
1—12" Enclosed Cent. Disc. Elevator, 78" Centers with Motor. Heavy case.

14—Speed Reducers, 2 to 15 H.P.

1—New 3'x5' Link-Belt U.P. Shake-out.

Johnson & Hoehler, Inc.
P. O. Box 102 Lansdowne, Pa.

NEW BUDA 4-BD-153 DIESEL ENGINES



BUDA LANOVA 4 CYLINDER DIE-SELS 3 7/8 x 4 1/4. 153/1 cu. in. piston displacement, 40.5 HP at 2400 R.P.M. With starters, generator, fly wheel, fly wheel housing, fan and fan belt. **NEW!** In original crates. Save approximately 1/2 at our low price of \$675.00 each F.O.B. Chicago, Ill.

ELECTRIC POWER PLANT

PORTABLE 70-75 KW

Electric Generator driven by BUDA gasoline engine. Model L00525, Type C12, 62.5 KVA. On four wheels with towing hitch, completely enclosed cabinet unit. Excellent condition. \$1,500 F.O.B. Chicago, Ill.

ACME EQUIPMENT CO. INC.

128 S. Clinton St.

AN. 3-3430

CHICAGO 6, ILLINOIS

FOR SALE

- 1 Shovel front complete, 3/4 yd., for Model 1020 Unit, \$1,300.00.
- 1 Hoe front complete, 1/2 yd., for Model 514 Unit, \$1,200.00.
- 2 FWD trucks, 10 size, good condition, with 150 hp Cummins Diesel engines, excellent condition, tires good, one truck with new tires. Wausau Plows with Wings.
- 1 FWD truck, 5 ton size, with Wausau Plow and Wing.

RAY SCHMITZ, INC.

211 So. 2nd Avenue, Wausau, Wisconsin
Phone 21798

FOR SALE

Model L Insley Dragline with G. M. Diesel motor. Used 17 months.

ROY PENCE

Route 2

Sidney, Ohio

Phone 78826

IN THE MARKET? USE THE CLEARING HOUSE

**Get Circulation
Where
It Counts!**

FOR SALE

We have the following equipment which is in excellent condition that must be sold to provide space for our growing manufacturing operation:

COMPRESSORS

- 1—600 ft. Diesel G.D., 998 hours
- 1—600 ft. Diesel G.D., 1031 hours
- 1—500 ft. Diesel G.D., 2743 hours
- 1—315 ft. Diesel G.D., 740 hours
- 1—210 ft. Diesel G.D., 1089 hours
- 1—105 ft. Gasoline G.D., 1 month
- 1—105 ft. Gasoline G.D., 4 months
- 1—60 ft. Gasoline G.D., 1 year

DRILLS

- 2—Wagon, Gardner Denver, like new
 - 3—Deep Hole, Gardner Denver, like new
- Wire, write, or call for special sales prices.
This equipment must be sold.

BROOKS EQUIPMENT & MFG. CO.

Subsidiary of Borg-Warner Corporation
1218 Davenport Rd. 1410 Cowart St.
Knoxville, Tenn. Chattanooga, Tenn.
Phone 3-7135 Phone 7-5527

FOR SALE or RENT

- 2—100 HP Lucey portable horiz. fire-box boilers, 200 lbs. Oil fired. ASME Code.
- 2—Jaeger 3-drum Hoists, 100 H.P. Continental Gas Engine 10,000# SLP. NEW.
- 1 1/4 yard Manitowoc 2000-B crane, Cat D13000 eng. 70' boom.
- 25 ton Orton Locomotive Crane, Cat Diesel. New 1942. Air Controls.

MISSISSIPPI VALLEY EQUIPMENT CO.
515 Locust St. St. Louis 1, Mo.

FOR SALE

- Thew Lorain 41 — 3/4 yd. Crawler Mounted Dragline Unit — Gasoline Powered — 30 ft. Boom — 30 in. Shoes.
- Northwest 25 — 3/4 yd. crawler mounted dragline unit — G-M Diesel powered — 35 ft. boom.
- Cleveland model 140 trencher — International UD9 diesel powered.
- Cleveland model 92 Trencher — Continental gasoline engine powered.
- Adams 5 yd. pneumatic tired 4 wheel scraper
- Semi-trailers complete with air brakes, beaver tail and 9.00x20 tires.

O'NEIL EQUIPMENT COMPANY
1999 Jefferson Street Phone 22-062
Muskegon Heights, Michigan

FOR SALE

1201 LIMA Dragline. 85 ft. boom, 7x10 type "L" Cummins Diesel engine. Serial No. 5273. Very clean. Excellent condition.

365 C.F. Jager Compressor. Cummins Diesel engine. Used very little.

PRICED FOR QUICK SALE

Phone 8-4131, or write,

ROSINI COAL CO.

P.O. Box 184 SHAMOKIN, PA.

For Sale: Barber-Greene Model 839-840 Asphalt Maintenance Plant with dryer and dust collector; B-G Anisher, Gallow 3-5 tons roller, Gallow 8-12 ton roller, 1,000# roller, Cleaver-Brooks 2 cu tank car heater, 12,000 gal. tank, 10,000 gal tank, both with coils. Purchased new in 1953 and in perfect condition. Must be purchased as a complete unit.

PANETTI BLACKTOP, INC.
Phone 8248 R. 2, Fond du Lac, Wisconsin

EQUIPMENT PRICED FOR QUICK SALE

- 1—Buckeye Hi-Way Widener Mod. 616-45 with 24", 30", 36" and 48" buckets, G.M. Diesel Eng. Mod. 371, 1 1/2 yr. old.
- 1—Austin-Western Grader Model 99-H, Ser. No. H3584, International Diesel Eng. Mod. UD 14A, Ser. 28179, fully equipped.
- 1—Lima No. 34 Paymaster Shovel, Ser. 2322, with G.M. Diesel Eng. Mod. 371; 3/4 C.Y. Shovel Front, 3/4 pull shovel attachment, 35' Crane Boom with fair leads.
- 1—Apsco Widener, Model 95, Ser. No. 203, 1 yr. old.
- 9—G.E. 60 Watt two way mobile radio stations and
- 2—G.E. 30 Watt two way radio base stations.

BLACK TOP PAVING COMPANY, INC.

9 East Beau St. Washington, Pa. Telephone: Washington 9305

FOR SALE GOOD USED EQUIPMENT

- D-8 Caterpillar tractors
- HD-20 Allis Chalmers tractors
- LeTourneau scrapers, Models RU-W-NP
- LaPlant-Choate scrapers, Model C-314
- LS-85 Link-Belt Speeder shovel or dragline or backhoe
- 80-D Northwest shovels and draglines
- 1201 Lima draglines
- 855 P&H shovel-dragline combination

Other equipment for contractors. All in good condition.
Catalog of used equipment sent on request.

J. A. TERTELING & SONS, INC.

Box 1428 — Boise, Idaho

TESTING SERVICE CORPORATION TESTING ENGINEERS ENGINEERING GEOLOGISTS

Foundation Investigations — Laboratory analyses and Evaluation of Construction Materials — Soil Mechanics, Concrete and Asphalt Technology. Field Inspection and Consultation. Special Investigations for Dams, Turnpikes and Airports.

710 North Brookfield

South Bend 28, Indiana

FOR SALE

- 1—Huber 10-Ton 3-Wheel Roller, with Caterpillar D-318 Engine. Overhauled and Painted. In Excellent Cond.
- 1—Austin-Western 10-Ton 3-Wheel Roller. In Good Condition.
- 4—Super "C" Tournapulls. All in Good Condition.

CONTACT:

Miller, Bradford & Risberg, Inc.
1330 Menomonie Street
EAU CLAIRE, WISCONSIN

FOR SALE

All of the following equipment operated and maintained by owners since new. Newly overhauled and painted. Located: Iron Gate, Virginia.

- 1—D7 (9G Series) w/11 CY Athey Wagon \$5,000
- 1—Hanson Model 41 Crane Shovel Combo, 1/2 CY 8,500
- 2—Athey Wagons Complete w/Hyd. Pumps, 14 CY, Each 3,000
- 1—Schramm 316 Air Comp. w/Int. Diesel 3,000
- 1—Owens 1/2 CY Clamshell Bucket 900

LANFORD & SLATER
3410 Hillcrest Ave. N.W.
ROANOKE, VIRGINIA
Phone 6-2579

FOR SALE IMMEDIATE POSSESSION

SUBJECT TO PRIOR SALE
Two Barges, Wooden, kept in excellent repair, 100'x24'x5' \$2,600 - \$3,000

Steamer James P. Pearson, Towboat & Sand Sucker, coal fired, 280 H.P. sternwheel, wood hull 36'x23'5"x4' Kept in excellent repair. Coast Guard 1954-55 inspected 7,500

Towboat "Invincible," wood hull, 51 x 14 x 3.4', Fairbanks Morse diesel model 35FB 3/4, good repair, gross tonnage 22.5 5,000

Houseboat or office on steel barge, 70'x16'x4', with water tank, heater, showers, toilet. Excellent cond. 5,000

Brownhoist-Locomotive crane, serial #9547, 25 ton, 30' boom, never used since overhaul, excellent mechanical, may need some boiler repair 2,500

Pioneer Jaw Crusher 9'x36", PB mounted on 4 steel wheels, fair condition. Serial #D-603, parts book #53872. 800

Allis-Chalmers #8107, 8" Superior McCully gyratory crusher #IG61930 P-8 in good condition. Make offer.

We have one 3/4 yd. Hayward bucket, \$250. One yard Hayward buckets, \$300. One sand drag 400

40-45 H.P. Caterpillar gasoline power unit. — Make us an offer.

Steam Boilers, off pump boat, twin 225 lb. pressure, 10 5" Flu's x 18", built in 1936 1,000

Steam Boiler — 40"x18" Mississippi type, 10 5" Flu's x 18", 175 lbs. pressure, built by Philip Rohan Boiler Co., St. Louis, Mo., 1925 500

Pump, 8" V-belt driven, complete, sheave, fittings, pipe connections. Make us an offer.

New oil, 55 gal. drums, weight unknown, good for outside lubrication and air cleaner \$5.00 per

Empty drums, 43 of 1.00 per

Stiff Leg Derrick Boom, 63", Lattice construction 100

Spuds, two of, 36"x12"x3/4" steel 750 per

Apron Feeder 84"x30" 1,000

INQUIRIES WILL RECEIVE OUR PROMPT ATTENTION

MOLINE CONSUMERS CO.
Telephone 2-5541 — Moline, Illinois
MR. N. R. LUNDEEN

Manufacturers' Literature

Soil Sampling Kit

A collection of 12 different earth and soil sampling tools is described in a 4-page circular issued by Soiltest Incorporated, 4522 W. North Ave., Chicago 39, Ill. Included in the set are 10 drill rods each 2 ft. 6 in. Additional rods for greater depths can be included. Samples recovered are approximately 1 1/2 in. diameter. All tools in the complete set are illustrated and described in the circular.

For more information circle 143 on Service Coupon Page 16 and mail now.

Bulk Handling of Calcium Chloride

"Recommended Procedures in The Bulk Handling of Calcium Chloride" is the title of an 18-page illustrated book-

SALE — RENT

Rental Purchase

CRANES — DRAGLINES — SHOVELS

Model 802 Lima Crane-Dragline.
Model 603 Lima Crane-Dragline.
Model 630 Bay City Crane-Dragline.
Lorain 50-K, Crane, Dragline shovel.

EUCLIDS — BARGAINS

24—13-yd. Bottom Dumps, Cummins, GM and Buda Engines.

DUMPTORS

2—Model 60-W Koehring Dumpsters.

BUCKETS

3/4 to 4 yd. dragline buckets.
3/4 to 1 1/2 yd. clamshell buckets.
1/2 to 2 yd. concrete buckets.

STEAM GENERATOR

Littleford Model 3500.

FINISHING MACHINES — Asphalt

Barber-Greene S/H 879-4-72.

PUMPS

1 1/2" to 6" centrifugal.
4" jet Gorman-Rupp.
6" jet Peerless 3-stage.
3" to 4" Diaphragm.

HOISTS

Clyde & American, 1, 2 & 3 drum.

SAWS

20" hand. Skil, radial, DeWalt, table. Skil—hand, C-P (air), chain.
Wright (air) chain.

MISCELLANEOUS

Jeep Ditcher.
Williams Auger, 20 ft. truck mounted.
Sullivan Shalesaw.
Sullivan Wagon Drill.

TEXAS CONSTRUCTION CO.

1201 Main St. Dallas, Texas
Phone AD 5-7134 E. R. Funk

let published by The Dow Chemical Co. The booklet tells how to establish, operate and expand facilities for bulk calcium chloride operations. Bulk handling of this chemical is based on Dow's development of "Peladow," a high-test, pellet-form of calcium chloride.

The booklet deals with four major subjects: (1) methods to be used when tank cars or dump trucks of dry calcium are to be made into liquid and stored (2) methods to be used in unloading dry calcium chloride pellets from railway or truck cars into elevated or semi-elevated storage tanks (3) methods and equipment involved in the spreading of both dry or liquid calcium chloride, and (4) equipment and materials necessary for the handling and storage operations.

The procedures are illustrated with line drawings. A table concerning the size and approximate dimensions of storage tanks is also included.

The booklet may be obtained free-of-charge by writing the Inorganic Chemicals Sales Department, The Dow Chemical Co., Midland, Mich.

For more information circle 144 on Service Coupon Page 16 and mail now.

20 HP Air-Cooled Compressor

A new 4-page, 2-color bulletin, Form 1540, describing its Model 20T compressor equipped with I-R channel valve has been published by Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.

STEEL CARFLOAT

10 car capacity. 257'x40'x10'. Easily convertible to deck lighter or derrick barge. Location: New York Harbor.

CONVERTED LCM

36'x16'x3'6" draft. Steel deck cabin, pilot house, guard rails. Twin Screw Diesels recently overhauled. Location: New York Harbor.

STEEL WORKBOAT

34'x8'x3'6". Diesel propelled — Waukesha 140 HP. 2 spare Waukesha Diesel Engines and parts. Location: Louisville, Kentucky.

STEEL FERRY — YERBA BUENA

4000 Passenger. 276'x47'x21' OAL. Turbo Electric 2600 SHP. Speed 15 Knots. Fully equipped. Location: San Francisco, Calif.

SELF-PROPELLED BUCKET DREDGE

"LORD COCHRANE". 215' x 41' x 16'6". Dredging Depth 45'. 2 Triple Expansion Engines — oil fired. Fully equipped for immediate operation. Large complement Spare Parts. Location: St. George's, Bermuda.

9 STEEL HOPPER BARGES

175' long, 26' to 30' Beam, 10-3/4' Deep. Location: Midwest.

2 NEW BUDA DIESEL ENGINES

17 KERMATH SEA RAIDER ENGINES

550 HP. All fully equipped. Location: Philadelphia, Pennsylvania.

100 & 300 KW MARINE TURBO GENERATORS

G.E. and Westinghouse 120/240 Volts D.C. Location: Philadelphia, Pennsylvania.

3-TON SPUR GEARED CHAIN HOISTS

10' Lift, Heavy Duty. Hand Operated. Location: New York.

All Priced Below Current Market Values.

FOR QUICK SALE!

J. C. BERKWIT & CO.

(Owners)

551 Fifth Ave. — New York 17, N.Y.
Phone: MU 2-2214 — Cable: BERKWITCO

This air-cooled 20 HP compressor may be either direct-connected or belt-driven. The bulletin includes cutaway views and a table of specifications.

For more information circle 145 on Service Coupon Page 16 and mail now.

Tandem Rollers

Bulletin S-68-555 describing its new standard tandem rollers has been released by Buffalo-Springfield Roller Co., Springfield, O. These rollers feature torque converter drive which automatically maintains constant rolling speeds, regardless of grade, uphill or down. There are five models: 5-8 ton, 6-9 ton, 8-10 ton, 8-12 ton, and 10-14 ton. Information on size, weight, rolling speeds and compression of these five models is given in the bulletin.

For more information circle 146 on Service Coupon Page 16 and mail now.

Oversize Traffic Signals

A 4-page booklet on their new 12-in. adjustable traffic signals has been published by Crouse-Hinds Co., Wolf and 7th North Sts., Syracuse, N.Y. Besides listing complete construction and application data, the bulletin contains mounting and price information for type H (stacks three 12 in. sections) or type K (one 12 in. and two 8 in. sections) signals.

For more information circle 147 on Service Coupon Page 16 and mail now.

With the Manufacturers and Distributors

NICHOLS APPOINTED SALES REPRESENTATIVE FOR CUMMER. Donald G. Nichols, formerly sales engineer with Tractor and Machinery, Inc., Atlanta, Ga., has been appointed southeastern sales representative and engineer for F. D. Cummer & Sons Co., Cleveland, O. He will be located at 697 Longwood Drive, N.W., Atlanta, Ga.

CUMMINS ENGINE PROMOTES WILLIAMS. Lloyd E. Williams, heretofore Rocky Mountain regional manager, Cummins Engine Co., Inc., Columbus, Ind., has been promoted to the position of manager-distributor of the company. He will be in charge of operation of the company's 12 regional offices, and handling of domestic distributor activities. He succeeds Paul J. Every, who is now assistant general sales manager.

NEW LE TOURNEAU-WESTINGHOUSE DISTRIBUTOR. Columbus Equipment Co., 50 East Kingston Ave., Columbus, O., has been appointed by LeTourneau-Westinghouse Co., Peoria, Ill., as central Ohio distributor for their line of high-speed, rubber-tired earth moving equipment.

NEW WORTHINGTON DISTRIBUTOR. A new distributor agreement has been executed between Worthington Corporation's portable Compressor and Contractors' Tool Division, Holyoke, Mass. and New Hampshire Explosives and Machinery Co., Inc., Concord, N.H. The new distributor will handle Worthington's line of portable compressors and contractors' tools throughout the entire state of New Hampshire.

WISCONSIN MOTOR CORPORATION NEW APPOINTMENTS. Several advancements have been announced by H. A. Todd, president Wisconsin Motor Corporation, Milwaukee, Wis.: Phil Norton, vice-president in charge of sales since 1950 has been appointed executive president. F. B. Esty has been advanced to chief engineer after serving as assistant chief engineer since joining the company in 1948. Ralph Switzer, who has been appointed director of research and development engineering joined the company in 1928. Miss Ann M. Crantz, for many years secretary to the president, has been named assistant secretary of the corporation.

HUBER-WARCO NAMES NEW DISTRIBUTORS. Huber-Warco Co., Marion, O. has appointed the following distributors for its complete line of tandem rollers, three-wheel rollers and graders: R. G. Moeller Co., 14415 Myers Road, Detroit, Mich.; Caird Engineering Works, Helena, Mont.; The Sawtooth Co., 1115 Grove St., Boise, Idaho; The Bode-Finn Co., 2650 Spring Grove Ave., Cincinnati, O.



DIG... DODGE... DIG was the order of the day as this Cleveland cut trench for utility mains and service lines on a new housing project in the Pittsburgh area. The Cleveland's easy maneuverability—enabling it to dodge around numerous obstructions in the rough ungraded fill—was a big factor in getting the utility lines in on schedule while many other construction jobs in the development were in progress. Your local distributor will gladly show you how Cleverlands will help you to *dig more trench . . . in more places . . . at less cost.* THE CLEVELAND TRENCHER CO., 20100 St. Clair Ave., Cleveland 17, Ohio

... for more details circle 182, page 16

Prevent DELAYS ON-THE-JOB with fast, sure GILSON Screen Testing

Foul-ups in sizing specifications can be costly. You can test every shipment of highway aggregate—quickly and accurately—with the GILSON Mechanical Testing Screen.

The GILSON Screen pays for itself many times over—and GILSON does the job fast—five minutes or less per complete test.

GILSON handles up to one cu. ft. of sample—crushed stone, gravel, slag, coal, ores
A Sand Attachment for handling 8-inch sieves is optional equipment.

Here's why you want GILSON

1. Makes tests quickly and accurately
2. Two to seven separations simultaneously
3. Screen trays independently removable
4. Trays balanced to same tare weight
5. Visible separation to refusal
6. Few moving parts
7. Sturdy construction
8. Size range 4" to 200-mesh

**NO MORE GUESSWORK ON SIZING
NO MORE TEDIOUS SCREENING BY HAND**

Write for information and prices



GILSON SCREEN COMPANY, Malinta, Ohio

... for more details circle 197, page 16



JOSEPH MASSAGLIA, JR., President

Hotel MIRAMAR AND BUNGALOWS
SANTA MONICA, Calif.

California's World-famous Resort—250 rooms
WILLIAM W. DONNELLY, Manager

Hotel SENATOR
SACRAMENTO, California

The Capital's Premier Hotel—400 rooms
CHARLES W. COLE, Manager

Hotel EL RANCHO & Bungalows
GALLUP, New Mexico

World's Largest Ranch House—200 rooms
MARTIN L. HANKS, Manager

Hotel PARK LANE
DENVER, COLORADO

Magnificent Rocky Mountain View—400 rooms
CHARLES W. COLE, Manager

Hotel RALEIGH
WASHINGTON, D. C.

On Famous Pennsylvania Ave.—500 rooms
JOHN F. SCHLOTTERBECK, Manager

Hotel BOND
HARTFORD, Conn.

Hartford's Finest—400 rooms
GRIFFITH R. DAVIES, Manager

Hotel SINTON
CINCINNATI, Ohio

Hospitality at its Best—700 rooms
JOHN SCHEIBLY, Manager

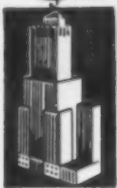
Hotel SHERWYN
PITTSBURGH, Pennsylvania

Center of Everything
MURREL F. VAUGHN, Manager

World-famed hotels—
Teletype service—Family Plan



GRAND CENTRAL RADIO CITY TIMES SQUARE



SHELTON



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ROYAL CREST



NEW YORK

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Comfortable Rooms
Sensible Rates
TV Available
Air Conditioning
Central Locations
Fine Food
Friendly Hospitality
Conventions
Garage AAA
(At the Shelton)
Enjoy the Free
Pool and
Monte Proser's
"La Vie"

NEW EAST COAST REPRESENTATIVE FOR INSLEY. Edwin K. McGill has been appointed east coast factory sales representative for Insley Manufacturing Corporation, Indianapolis, Ind.

NEW EUCLID DISTRICT REPRESENTATIVES. Two new district representatives have been appointed by Euclid Division, General Motors Corporation, Cleveland, O. William R. Morrissey will represent Euclid in western New York and Ontario and Quebec, with headquarters in Buffalo, N.Y. Donald E. Lutz is the new Euclid representative for Arkansas, Louisiana, Mississippi and western Tennessee with headquarters in Memphis, Tenn.

INTERNATIONAL TRANSFERS GREENE TO CHICAGO. Wayne E. Greene, formerly motor truck district sales manager at New Orleans, La., for International Harvester Co., has been transferred to Chicago in the same capacity. He replaces M. F. McCarty, Harvester's Chicago motor truck district manager for the past 23 years. In anticipation of his retirement McCarty will serve as supervisor of national and fleet sales in the Chicago area.

NEW GRADALL DISTRIBUTORS. Three new distributors have been appointed by Gradall Division of the Warner & Swasey Co., Cleveland, O.: Dow & Co., Inc., 1820 Elmwood Ave., Buffalo, N.Y., for western part of New York; State Tractor & Equipment Co., Phoenix, Ariz., for state of Arizona; Stith Equipment Co., Atlanta, Ga., for state of Georgia.

JOY NAMES ARCHIBALD DISTRICT SALES MANAGER. Joy Manufacturing Co., Pittsburgh, Pa., has appointed Donald L. Archibald district sales manager in the New England area, with headquarters in Boston, Mass.

TWIN COACH CO. ACQUIRES DAVEY COMPRESSOR CO. The Twin Coach Co., Kent, O., has acquired the Davey Compressor Co., Kent, O. The Davey Compressor Co. will continue to operate with present personnel and management as a wholly-owned subsidiary of Twin Coach Co.

PERSONNEL CHANGES AT JAEGER. A. C. (Andy) Thomas has been promoted from Truck Mixer Division sales manager of The Jaeger Machine Co., Columbus, O., to assistant general sales manager of the company. Emil L. Baugh, for the past 10 years southeastern district sales representative, succeeds Mr. Thomas. R. E. (Dick) Fowler, heretofore special field representative succeeds Mr. Baugh.

PECK APPOINTED VICE-PRESIDENT GAR WOOD. Milton G. Peck, formerly sales manager of electrical industrial truck division of Clark Equipment Co., has been appointed vice-president and director of sales and advertising for Gar Wood Industries, Inc., Wayne, Mich.

CATAPHOTE APPOINTED DISTRIBUTOR FOR ALCOA SIGN BLANKS. Cataphote Corporation, Toledo, O., has been appointed distributor for Alcoa sign blanks for making highway warning and other traffic control signs.

LESCHEN APPOINTS DOUGHERTY SALES REPRESENTATIVE. Pat E. Dougherty has been appointed district sales representative for Leschen Wire Rope Division, H. K. Porter Co., Inc. His territory covers Washington, western Idaho and northwestern Montana.

BOURNE APPOINTED DIRECTOR OF SALES. Robert F. Bourne has been appointed director of sales — national accounts, for the Colorado Fuel and Iron Corporation. Edwin F. Lord succeeds Mr. Bourne as general manager of sales for the Claymont Steel Products Department of CF&I.

JONES APPOINTS PUBLIC RELATIONS SUPERVISOR. Nathaniel E. Jones, formerly director of public relations for Illinois State Chamber of Commerce, has been appointed public relation supervisor for R. G. LeTourneau, Inc., Longview, Tex.

SEARS NAMED GORMAN-RUPP REPRESENTATIVE. Robert L. Sears has been named South-Central District Representative for the Gorman-Rupp Co., Mansfield, O. He joined Gorman-Rupp in 1954 after seven years experience in the pump industry.

NEW INTERNATIONAL HARVESTER DISTRIBUTOR. Metalweld, Incorporated, Hunting Park Ave., and Fox St., Philadelphia 29, Pa., has been appointed International industrial power distributor in the Philadelphia area. The appointment was announced by I. P. Payne, manager of International Harvester industrial power sales.

CAMPELLO APPOINTED SALES MANAGER. Robert Campello has been appointed sales manager of Marion Power Shovel Co., Marion, O. In his new post he will be in charge of sales of all Marion machines sold through distributors in the United States and Canada. A veteran of long standing in the power shovel industry, he was associated with the Bucyrus-Erie Co. for 17 years in various sales capacities prior to coming to Marion.

NEW HENSLEY DISTRIBUTORS. The Hensley Equipment Co., Inc., San Leandro, Calif., has appointed the following distributors: Western Traction Co., Sacramento, Calif.; Pacific Hoist & Derrick Co., Seattle, Wash.; General Machinery Corp., Atlanta, Ga.; Columbia Equipment, Ltd., Vancouver, B. C.

NEW WORTHINGTON DISTRIBUTOR. Dove Creek Equipment & Supply Co., Dove Creek, Colo., has been appointed distributor by Worthington Corporation's Portable Compressor and Contractors' Tool Division for counties in Arizona, Colorado and New Mexico.

LESCHEN MOVES OFFICE TO NEWARK. The New York district office and warehouse of Leschen Wire Rope Division, H. K. Porter Co., Inc., has been moved to 219 Emmet St., Newark, N. J.

ARMENTROUT APPOINTED REGIONAL MANAGER. L. A. (Larry) Armentrout has been appointed regional manager for the northeast by The Truckstell Mfg. Co., Cleveland, O.

BLAW-KNOX PROMOTES HOHMAN. A. E. Hohman, advertising manager of Blaw-Knox Co., Pittsburgh, Pa., since 1944 has been appointed coordinator of special sales activities. In his new position, Mr. Hohman will serve the sales department in the evaluation of advertising, sales promotion and special marketing activities. He joined Blaw-Knox in 1920 and served in various advertising capacities before being appointed advertising manager. Paul F. Vollmer, formerly assistant advertising manager, has been appointed advertising manager, to succeed Mr. Hohman.

NEW DISTRIBUTOR FOR GALION ALLSTEEL BODY CO. Acme Spring & Equipment Co., 626 Maryland Ave., Charleston, W. Va., has been appointed distributor by The Galion Allsteel Body Co., Galion, O., for central West Virginia.

MURPHY APPOINTED EXECUTIVE VICE-PRESIDENT. William D. Murphy, formerly vice-president, has been appointed executive vice-president of Seaman-Andwall Corporation, Milwaukee, Wis. James G. Norris, heretofore a district supervisor, has been appointed sales manager in charge of Seaman-Andwall Industrial Division.

FOR THE FINEST CONCRETE PIPE... YOU NEED FINEST FORMS!

THE Quinn Standard

Backed by over 40 years of reliable service, the QUINN STANDARD is recognized as the finest concrete pipe form the world over. Thousands of pipe manufacturers, from the smallest to the largest, look to Quinn for equipment to produce the finest concrete pipe at the lowest possible costs.

• QUINN HEAVY DUTY PIPE FORMS

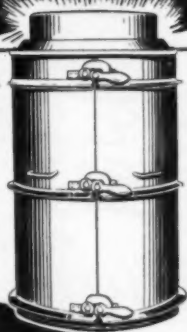
For making pipe by hand methods by either the wet or semi-dry process. Sizes for pipe from 10" to 120" and larger. Tongue and groove or bell end pipe in any length desired.

WRITE TODAY for complete information and estimates.

Also manufacturers of

QUINN CONCRETE PIPE MACHINES

Quinn WIRE & IRON WORKS
BOONE, IOWA



... for more details circle 235, page 16



for your Pleasure

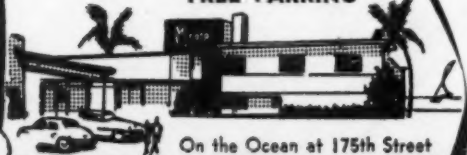
Monaco

LUXURY RESORT MOTEL

Everything for a perfect vacation is waiting for you at Monaco—tropical, informal living at its best!

Private Pool and 200 feet of Private Beach, Cocktail Lounge, Coffee Shop, Game Room, Fishing and Sightseeing trips arranged. Luxurious accommodations—rooms and efficiencies. Completely air-conditioned and heated. Television (also available in rooms).

FREE PARKING



On the Ocean at 175th Street

MIAMI BEACH

ROADS AND STREETS, July, 1955

GET TOUGH CONCRETE



The toughest punishment handed to concrete is on highways. Correct curing is the vital factor in making concrete tough. Reinforced waterproof paper is proved the best curing medium*. Sisalkraft paper is the No. 1 choice on highways — and all types of commercial and industrial building — throughout U.S.A. American Sisalkraft Corporation, Dept. RS-7 Attleboro, Mass.

*Send for Concrete Curing Bulletin CE2.

WITH TOUGH SISALKRAFT

Waterproof, Reinforced Paper

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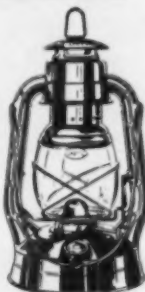
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**SAFETY
FROM A
SINGLE
SOURCE**

DIETZ LANTERNS & TORCHES

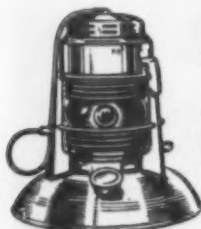
DIETZ TUBULAR LANTERNS

A complete line of economical long burning kerosene lanterns available with Ruby, Clear, Blue, Green Amber Globes. Dependable, rugged quality backed by the oldest and largest manufacturer of Portable Light.



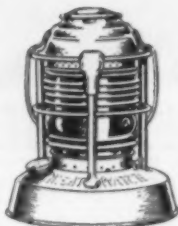
DIETZ-EMBURY "TRAFFIC-GARD" SAFETY LANTERN

"Magnified-Beam" seen for great distances. Wide, non-tip base. Long burning, economical. Stands rough usage.



DIETZ "NIGHT WATCH" SAFETY LANTERN

A miniature beacon with new "Pencil Beam" - visible from any direction, near and far. Longest burning - over 100 hours on a pint of kerosene.



DIETZ HIGHWAY TORCHES

Complete line of bomb and flat base, Dietz Blue threaded collar burner models, and Dietz-Embury Red can lock burner models. Tops in rugged quality.



SINCE
1840

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Descriptive folders

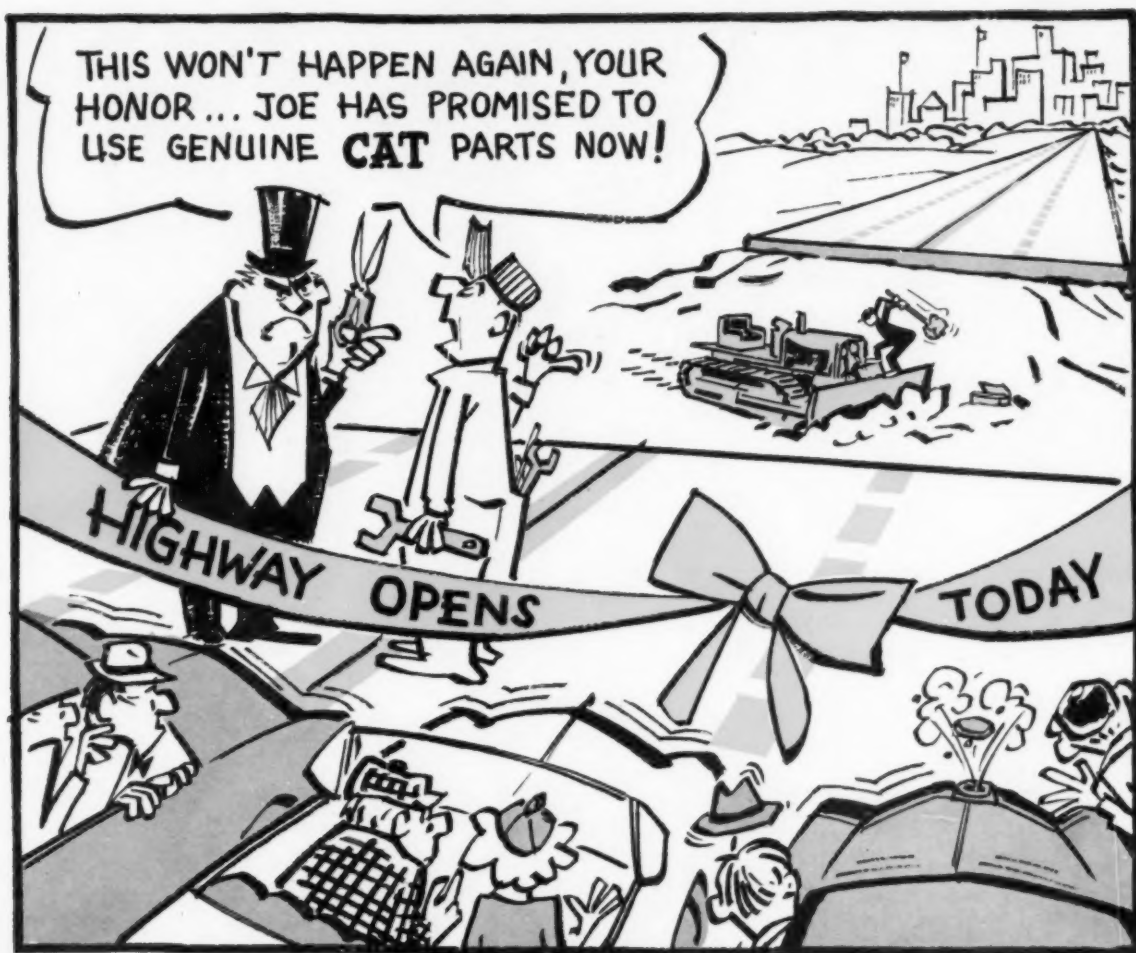
EST. R.E. DIETZ COMPANY 1840
SYRACUSE 1, N. Y.

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Down time can upset *any* schedule. Best way to avoid it is to insist on genuine CAT* parts every time. Then you're sure of getting parts that are made to the latest design, precisely manufactured of the right materials, rigidly inspected and tested.

Take track shoes, for example

"If the shoe fits, put it on," can often be bad advice. Other makes of track shoes may *fit* all right, but how will they *wear*? It took years of research and field testing to develop Caterpillar's exclusive hardening process which makes genuine Cat shoes wear up to 75% longer than most others. The Cat shoes pictured here (a standard shoe, and

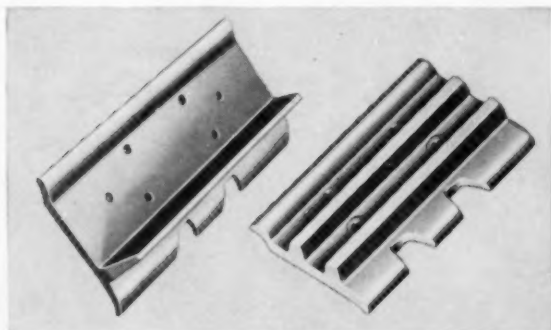
a double grouser shoe for roughest rock conditions) are made of specially rolled high-quality steel sections—with a yield strength of 100,000 lbs. per square inch. With a substitute track shoe: who can be sure?

The difference on the job: with genuine Caterpillar-built track shoes you can count on longer work life, there's less replacement, and you get better performance under any working conditions.

With substitute parts: who can be sure?

Better get genuine Caterpillar parts every time.

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.



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CATERPILLAR*

*Both Cat and Caterpillar are registered trademarks—®



Gets extra years of service from old Asphalt street

An important advantage of asphalt paving is the speed and economy with which its life can be prolonged, after it has given years of satisfactory service. The city of Mansfield, Ohio, demonstrates this desirable feature of asphalt on the North Main Street paving project shown here.

For years the asphalt pavement on this Mansfield thoroughfare had served the city's heaviest local traffic, in addition to the through traffic of State Route 13. Last year, a new plant-mixed Texaco Asphaltic Concrete pavement, consisting of two courses having a combined thickness of $2\frac{3}{4}$ inches, was laid over the old asphalt pavement. Because of the perfect bond established between the new and the old asphalt courses, a homogeneous pavement is obtained, which will withstand North Main Street traffic for years to come with a minimum of upkeep.

Your own paving problem may involve the resurfacing of old asphalt, cement concrete or other pavements, the construction of a new expressway, or the low-cost surfacing of secondary roads or streets. Whatever your problem, Texaco Asphalt Cements, Cutback Asphalts and Slow-curing Asphaltic Oils offer a wide choice of street or highway improvement types, which vary in durability and cost. Helpful information concerning all of these asphalt types is supplied in two free booklets which you can secure without obligation by writing our nearest office.

Contractor
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Mansfield, Ohio

THE TEXAS COMPANY, Asphalt Sales Div., 135 E. 42nd Street, New York City 17
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TEXACO ASPHALT



Adding a new $2\frac{3}{4}$ -inch Texaco Asphaltic Concrete surface to the old asphalt pavement on North Main Street means many extra years of service for Mansfield, Ohio, traffic.